DOCUMENT RESUME

ED 449 351 CE 081 266

AUTHOR	Miller, Greg, Ed.
TITLE	21st Century Research for Agricultural Education. Proceedings of the National Agricultural Education Research Conference (27th, San Diego, California, December 6, 2000).
INSTITUTION	American Association for Agricultural Education. Research Commitee.
SPONS AGENCY	Association for Career and Technical Education, Alexandria, VA. Agricultural Education Division.
PUB DATE	2000-12-06
NOTE	704p.
AVAILABLE FROM	For full text: http://www.aged.tamu.edu/conferences/NAERC2000/index.html.
PUB TYPE	Collected Works - Proceedings (021) -- Information Analyses (070) -- Reports - Research (143)
EDRS PRICE	MF04/PC29 Plus Postage.
DESCRIPTORS	Adult Education; Agribusiness; *Agricultural Education; Animal Husbandry; Animation; Beginning Teachers; Block Scheduling; Career Awareness; Cognitive Style; *Distance Education; Educational Assessment; Educational Needs; *Educational Research; *Educational Technology; Elementary Secondary Education; Entrepreneurship; Environmental Education; Evaluation Methods; Extension Agents; Extension Education; Farmers; Foreign Countries; Formative Evaluation; Higher Education; Inservice Education; Land Grant Universities; Leadership Training; Needs Assessment; Pollution; Predictive Measurement; Preservice Teachers; Professional Development; Program Evaluation; Program Improvement; Protocol Analysis; Research Methodology; School Holding Power; Science Education; Service Learning; Student Attitudes; *Student Organizations; Student Participation; Student Recruitment; Student Teaching; Teacher Attitudes; *Teacher Education; Undergraduate Study; Volunteers
IDENTIFIERS	Agricultural Sciences; Florida; Future Farmers of America; Iowa; Minnesota; Montana; New Mexico; North Carolina; Peru; South Carolina; Sustainable Agriculture; Texas; Utah; Virginia

ABSTRACT

These proceedings contain 48 presentations and 15 poster abstracts. Papers include "Computer Tasks Required in Selected Undergraduate Agriculture Courses" (Johnson, Ferguson, Vokinnns, Lester); "College of Agriculture Faculty Perceptions of Electronic Technologies in Teaching" (Dooley, Murphy); "Steering Through Turbulent Waters While Developing a Community of Practice" (Corn, Trexler); "Personality Types and Final Grades in Group Organization and Leadership Development" (Wingenbach); "Leadership Styles of Florida's County Extension Directors" (Rudd); "Involvement of Volunteers in Agricultural Education Programs in New Mexico" (Rosencrans, Seevers); "Safety and Health Attitudes and Beliefs of Entry-Year Agriculture Teachers in Texas" (Ullrich, Hubert, Murphy); "Examination of Pollution Prevention in Montana Secondary Agricultural Education Laboratories" (Bass, Frick); "Professional Development Needs of State Extension Specialists" (Radhakrishna); "Balancing Work and Family" (Place, Andrews, Crago); "Impact

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of Overseas Assignments on Individual, Organizational, and Community Attitudes, Behaviors, and Support for International Extension Involvement" (Place); "Principals' Perceptions of Integrating Science into Agriculture Programs" (Thompson); "Factors That Encouraged, Discouraged, and Would Encourage Students in Secondary Agricultural Education Programs to Join the FFA" (Gliem, Gliem); "Assessing Research Capacity in Agricultural Education" (Greiman, Birkenholz);"Educational Needs of Beginning Farmers in Iowa as Perceived by Providers of Agricultural Education" (Nelson, Trede); "Qualitative Study of the Influence of Farm Leaders' Ideas on a Sustainable Agriculture Education Program" (Grudens-Schuck); "Evaluation of a Workshop for Agricultural Entrepreneurs" (Mueseler, Terry, Holcomb); "Predictors of FFA Program Quality" (Vaughn, Moore); "Image Factor" (Croom, Flowers); "Building Confidence and Personal Pride" (Balschweid, Talbert); "Exploring the Past of the New Farmers of America" (Wakefield, Talbert); "Overcoming Barriers to Learning in Distance Education" (Irani, Scherler, Harrington, Telg); "Evaluation of a Multidisciplinary Course Delivered at a Distance" (Dooley, Patil, Lineberger); "Interest in Online Leadership Education and Implications for Instructional Design Strategies" (Murphrey, Boyd); "Predicting College Agriculture Students' Academic Performance and Retention" (Garton, Dyer, King, Ball); "Assessment of Agricultural Education Graduates' Preparation for Careers in Teaching and Industry" (Cartmell, Garton); "Clinical Experiences for Agricultural Teacher Education Programs in North Carolina, South Carolina, and Virginia" (Dobbins, Camp); "Cooperating Teachers' Perceptions of Important Elements of the Student Teaching Experience" (Edwards, Briers); "Description of the Nature and Impact of Teaching Events and Alternate Forms of Beginning Teacher Assistance Experienced by Beginning Minnesota Agricultural Education Teachers" (Joerger, Boettcher); "Using Think-Aloud Protocols to Compare Cognitive Levels of Students and Professors in College Classrooms" (Whittington, Lopez, Schley, Fisher); "Beliefs About a Constructivist Model for Teaching Compared with Traditional Teaching Methods Among Teacher Education Students" (Wardlow, Scott); and "Perceptions of Freshman Agriculture Majors of Alternative Versus Conventional Agricultural Paradigms" (Graham). Poster abstracts include "Curriculum Model for Distance Education AgEdS 315 Leadership and Group Dynamics" (Carter, Teig); "Biotechnology and Agriscience Research Course and Curriculum Development" (Wilson); "Learning Assessment Tool for a New Natural Resources Curriculum in Utah's Agricultural Education Program" (Middleton, Francis, Call, Straquadine); "Teaching Portfolios" (Thompson, Nelson); "Integrating Animal Science Courses in High School Agricultural Education Programs in North Carolina" (Gibson, Mathias, Hass); and "Using Real Cases for Instruction" (Graham). (YLB)

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ED 449 351

Proceedings of the 27th

National Agricultural Education Research Conference

2000

"21st Century Research for Agricultural Education"

Volume XXVII

December 6, 2000

San Diego, California

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National Agricultural Education Research Conference Locations and Chairs

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Hollie Thomas	Florida State University	1975	Anaheim, CA
Glen Shinn	Mississippi State University	1976	Houston, TX
William Richardson	Purdue University	1977	Atlantic City, NJ
Bennie Byler	Mississippi State University	1978	Dallas, TX
Ronald Brown	Mississippi State University	1979	Anaheim, CA
L. H. Newcomb	The Ohio State University	1980	New Orleans, LA
Maynard Iverson	North Carolina State University	1981	Atlanta, GA
Dale Oliver	Virginia Tech	1982	St. Louis, MO
Paul R. Vaughn	New Mexico State University	1983	Anaheim, CA
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Thomas H. Bruening	The Pennsylvania State University		
David E. Lawver	Texas Tech University	1994	Dallas, TX
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Leon G. Schumacher	University of Missouri	1995	Denver, CO
Robert J. Birkenholz	University of Missouri		

National Agricultural Education Research Conference Locations and Chairs

NAERC Chairs (s)	Institution	Year	Location of NAERC
George W. Wardlow	University of Arkansas	1996	Cincinnati, OH
Donald M. Johnson	University of Arkansas		
James J. Connors	University of Idaho	1997	Las Vegas, NV
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Gary Moore	North Carolina State University	1998	New Orleans, LA
James Flowers	North Carolina State University		
Agricultural Education and Communication Dept.	University of Florida	1999	Orlando, FL
Greg Miller	Iowa State University	2000	San Diego, CA

The Peer Review Process

The National Agricultural Education Research Conference (NAERC) is the premier professional event in which research in Agricultural Education is communicated orally and in written form to the profession. Agricultural Education professionals from throughout the United States and around the world submit their most recent research for presentation at the annual research conference.

Each paper proposal was sent to three Agricultural Educators as part of the blind review process. Only papers receiving the most favorable reviews were accepted for presentation at NAERC and for publication in the proceedings. One hundred and eight paper proposals were submitted for review by the postmark date of June 1, 2000. A distinguished group of 56 Agricultural Educators served as paper reviewers.

Based on the reviewers' recommendations, the top 48 papers were accepted for presentation at the 2000 NAERC. The review process resulted in the acceptance rate of 44%.

2000 National Agricultural Education Research Conference Paper Reviewers

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Susie Whittington	The Ohio State University
Gary Wingenbach	Mississippi State University

Acknowledgments

The National Agricultural Education Research Conference is possible because of the dedicated service of many individuals. Paper reviewers, paper discussants, session chairs, session facilitators, and authors who submitted their work for consideration are all especially important contributors to the National Agricultural Education Research Conference.

Appreciation is extended to the faculty and staff in the Department of Agricultural Education and Studies at Iowa State University for their support of NAERC 2000. The work of Cheryl Abrams, Carrie Fritz, and Kara Ladlie in developing, editing, and producing materials for the conference was greatly appreciated. Special thanks is extended to Dr. Robert Martin who made sure that sufficient resources were devoted to this important activity. He also provided leadership for facilitating the closing general session. Special thanks are also extended to Dr. Henry Bahn and USDA-Higher Education Programs for supporting a special USDA project that provided financial support for the closing general session.

27th National Agricultural Education Research Conference

NAERC
2000
21st Century Research
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Computer Experiences, Self-Efficacy and Knowledge of Students Enrolled in Selected Upper-Division University Agriculture Courses

Donald M. Johnson
James A. Ferguson
Melissa L. Lester
University of Arkansas

Abstract

Students (n = 169) enrolled in eight upper-division agriculture courses at a land-grant university were surveyed during the Fall 1999 semester to determine their computer experiences, computer self-efficacy, and computer knowledge. The students reported a variety of computer experiences, with 79% having completed a computer course and 66% owning a computer. Over one-half of the students had received formal instruction in word processing (76%), file management (71%), spreadsheets (71%), electronic mail (64%), presentation graphics (62%), Internet use (62%), and databases (51%). Computer programming was the only topic that a majority (66%) of respondents had not studied. The students had a slightly above average level of computer self-efficacy. Students felt they had the highest levels of skill in word processing, electronic mail, and Internet use, with more than 50% rating their skills in these areas as above average. The overall score on the 35 item multiple choice test of computer knowledge was fairly low, with a mean of 17.6 (50.3% correct). Nearly three-fourths (72.7%) of the students scored 60% or less on the test. There was only a low association (r = .29) between computer self-efficacy and computer knowledge. Recommendations for enhancing student computer experiences are offered.

Introduction

Computers are an integral and pervasive feature of modern society. According to the United States Department of Education (USDE, 1996):

> Computers and information technologies are transforming nearly every aspect of American life. They are changing the way Americans work and play, increasing productivity, and creating entirely new ways of doing things. Every major U.S. industry has begun to rely on computers. (p. 9)

Computers also play an important and ever increasing role in agriculture (Odell, 1994). In follow-up studies, university agriculture graduates consistently rate computer skills as being important to career success (Andelt, Barrett, & Bosshamer, 1997; Graham, 1997). In a follow-up study of Pennsylvania State University agriculture graduates, respondents rated computer skills as slightly more important to job success than technical agriculture skills (Radhakrishna & Bruening, 1994).

Employers of university agriculture graduates also place significant importance on computer skills. In a study of 150 employers of recent Cornell University agriculture graduates, 83% indicated that computer skills were either an "important" or "very important" factor considered in making employment decisions (Monk, Davis, Peasley, Hillman, & Yarbrough, 1997). Given the prevalence and importance of computers in both agriculture and society, university agriculture programs must ensure that graduates are competent in computer use (Davis, 1997; Johnson, Von Bargen, & Schinstock, 1995; Langlinas, 1994). Yet, Heyboer and Suvedi (1999) found that recent graduates (1993 - 1998) of Michigan State University felt that they had received less than satisfactory preparation in computer use, and rated computers as being the area in which they were least prepared for employment.

Monk et al. (1996) determined that agriculture graduates should be proficient in word processing, presentation graphics, spreadsheet analysis, database management, technical graphics, Internet use and electronic mail. Further, graduates should be comfortable enough with computer and information technologies so that they could continue to learn new computer skills throughout their careers. Researchers at the University of Wisconsin-Stout also found that abilities in these same areas were important for both academic and career success for students in a wide range of majors (Furst-Bowe et al., 1995).

Recognizing the importance of computers in agriculture, Bekkum and Miller (1994) surveyed deans at 71 land-grant colleges of agriculture to determine the strategies used to ensure that graduates of these colleges were proficient in computer use. Of the 59 deans responding, less than one-half (44.1%) reported a college-wide computer education requirement. Further, 11 (18.6%) of the deans believed that, in the future, less time would be required for basic computer skill development since students would have developed these skills before entering college. According to Kieffer (1995), many university faculty members and administrators accept the premise that students enter college already possessing basic computer skills.

Johnson, Ferguson & Lester (1999) tested this premise by assessing the computer experiences, self-efficacy and knowledge of students ($\underline{N}$ = 175) enrolled in three freshman-level agriculture courses at a land-grant university during the fall 1998 semester. The results indicated that the students had not completed a common core of computer experiences, lacked confidence in their computer skills, and had a low level of computer knowledge (as indicated by a mean score of 38.8% correct on a 35-item multiple choice exam). These results were in agreement with those of Gordon and Chimi (1998) who found that students entering a college of business lacked sufficient computer skills and recommended continuation of the introductory computer literacy course requirement.

Both agriculture graduates (Andelt et al., 1997; Graham, 1997; Radhakrishna & Bruening, 1994) and employers (Davis, 1997; Johnson et al., 1995; Langlinas, 1994; Monk et al.,1996) strongly agree that computer skills are important for career success. Yet, research indicates that students entering (Johnson et al.,1999) and graduating from (Heyboer and Suvedi,1999) colleges of agriculture may lack the computer skills necessary for career success.

This study was undertaken to examine the computer experiences, self-efficacy and knowledge of students enrolled in upper-division agriculture courses in one land-grant university. The results would provide information necessary for enhancing the computer education of students enrolled in the college.

Objectives

This study was conducted to determine:

1. the demographic characteristics and computer-related experiences of students enrolled in selected upper-division university agriculture courses;
2. the computer self-efficacy of students enrolled in selected upper-division university agriculture courses;
3. the computer knowledge of students enrolled in selected upper-division university agriculture courses, as measured by scores on the exam portion of the Computer Experiences and Knowledge Inventory (CEKI); and
4. the relationship between demographic characteristics, computer-related experiences, computer self-efficacy, and scores on the exam portion of the CEKI for students enrolled in selected upper-division university agriculture courses.

Methods

This study was conducted using a descriptive-correlational design (Ary, Jacobs, & Razavieh, 1990). The population consisted of students enrolled in eight upper-division "capstone" courses offered in seven agriculture departments within the College. These courses were purposively selected (after consultation with department representatives) in order to gain access to students from a wide range of majors. Official class rosters indicated a total, unduplicated enrollment of 185 students in these courses; 169 students provided usable data for a 91.3% response rate. Since a random sample of students was not studied, the findings of this study should not be generalized beyond these respondents. However, the present study does provide essential information both for local decision-making and further research.

Data were collected by student responses to the "Computer Experiences and Knowledge Inventory" (CEKI) (Johnson et al.,1999). The CEKI was administered during the first two weeks of the fall 1999 semester by each course instructor during a regularly scheduled class period. The CEKI consisted of three parts. Part One contained 24 items related to respondent demographics and previous computer experiences. Part Two consisted of eight Likert-type items requiring respondents to assess their own level of skill (1 = "no skill"; 5 = "high skill") in eight specific areas of computer use. Part Three was composed of 35 multiple choice items (with 5 response options, including a "Do not know" option) designed to measure computer knowledge in the areas of: general computer knowledge (six items), Internet use (five items), word processing (eight items), file management (five items), spreadsheets (six items), databases (three items), and BASIC computer programming (two items). All items in Part Three were written so as to be answerable by persons familiar with common operating systems and application programs. In other words, the items were not software specific.

The CEKI was evaluated by a panel of five experts with experience in teaching introductory computer applications to college agriculture students and was judged to possess face and content validity. In a previous study involving students enrolled in introductory undergraduate agriculture courses, reliability estimates of .87 (coefficient alpha) and .81 (KR-20) were obtained for Part Two and Part Three, respectively, of the CEKI (Johnson et al., 1999). For the present study, reliability estimates of .88 (coefficient alpha) and .85 (KR-20) were obtained for Parts Two and Three, respectively. The reliability of Part One was not assessed since, according to Salant and Dillman (1994, p. 87), responses to non-sensitive, demographic items are subject to "very little measurement error."

Results

The typical respondent was a 22-year-old (median), male (67%), classified as a senior (44%). (An additional 31% were graduate students, while 22% were juniors and 2% were sophomores.) Over one-half (56%) of the students indicated a grade point average of 3.0 or higher (self-reported). The most commonly reported majors were agribusiness (21%), poultry science (19%), and animal science and crop science (11% each).

The respondents reported a variety of computer-related experiences. Nearly two-thirds (66%) of the respondents owned a computer, with virtually all computers being IBM-compatible (96%) and using various versions of the Windows® operating system (98%). Approximately four out of five (79%) students had completed a computer course, with the largest percentage (34%) having completed two courses. As shown in Figure 1, a majority of the respondents reported that they had received formal instruction in seven of the eight computer topics studied. However, a significant percentage of students, ranging from 24% for word processing to 66% for computer programming, reported never having received formal instruction in each of the eight computer topics.

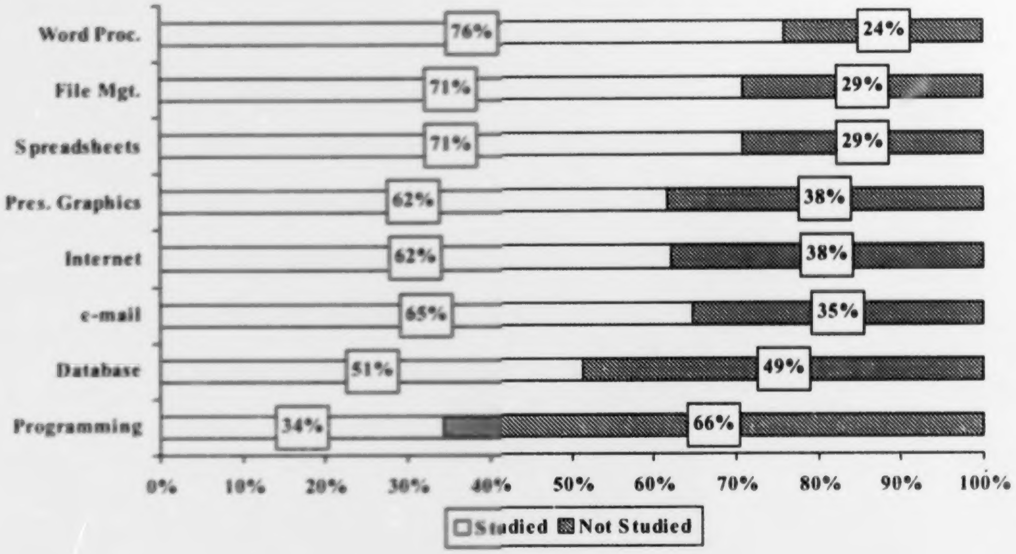

Figure 1. Percent of respondents having studied selected computer topics (n=168).

In order to assess the students' academic computer use in a global fashion, the respondents were asked to indicate the extent to which courses completed at this university had required the use of four common computer applications. (Note: A number of first semester graduate students did not respond to this item since they were not graduates of this university.) As shown in Figure 2, word processing was the only computer application that a majority of the respondents felt was required either "fairly often' or "often" in their courses. A majority of respondents reported that the use of databases, spreadsheets, and presentation graphics were required "not at all" or "seldom" (Figure 2).

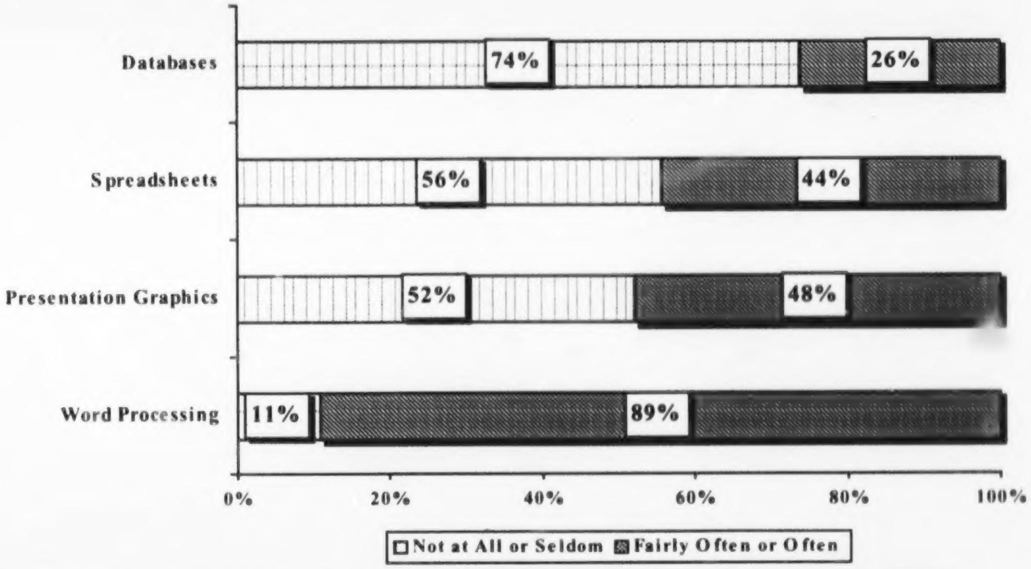

Figure 2. Extent to which courses at this university required the use of selected computer applications (n = 147).

The respondents were also asked to rate their own level of skill in each of the eight areas of computer use on a 5-point Likert-type scale (1 = "no skill"; 5 = "high skill"). These five response categories were subsequently collapsed into three categories for reporting purposes. Over one-half of the respondents rated their skills in word processing, e-mail, and Internet use as being "above average." A majority of the students felt that they had either "average" or "above average" skills in file management, spreadsheet use, and presentation graphics. Conversely, a majority of respondents felt they had "below average" skills in database use and computer programming. Although a minority, a sizable percentage of students rated their skills in using spreadsheets and presentation graphics as being "below average." These data are summarized in Figure 3.

Responses to the eight individual items reported in Figure 3 were summed and averaged (using the original 5-point scale) to arrive at a composite measure of computer self-efficacy (CSE) for each respondent (alpha = .88). The distribution of scores for the variable CSE was slightly positively skewed (skewness = .38) with a mean of 3.14 (SD = .73) and a median of 3.00.

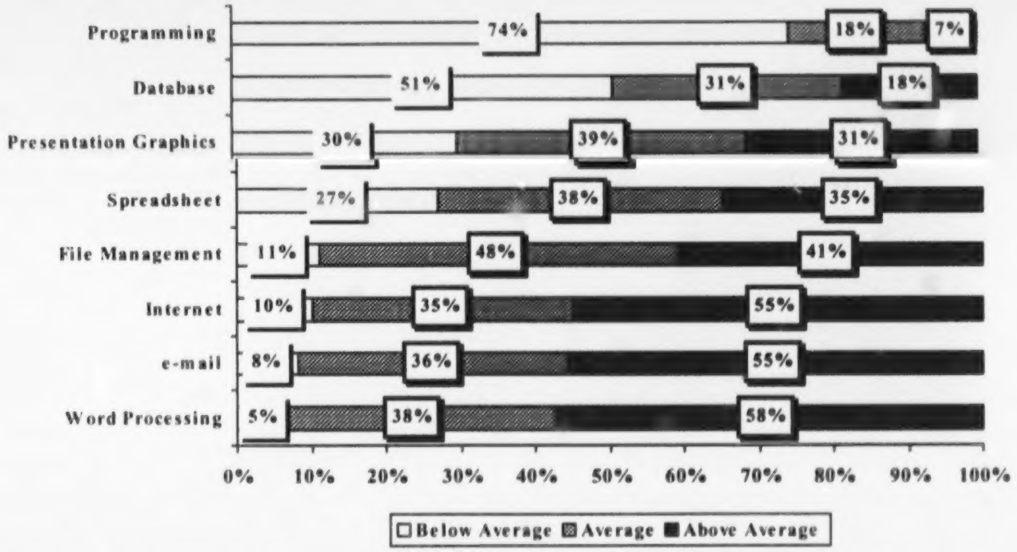

Figure 3. Self-Perceived level of skill in selected areas of computer use (n = 169).

The overall score on the 35-item exam portion of the CEKI was 17.6 (50.3% correct) with a standard deviation of 6.2, and a median of 17.0 (48.6% correct). When student scores on the exam portion of the CEKI were grouped by major, mean scores ranged from a low of 14.2 (40.6% correct) for turfgrass management majors (n = 12) to a high of 21.9 (62.6% correct) for agricultural education, communication and technology majors (n = 7). As shown in Figure 4, nearly three-fourths of all students (72.7%) scored 60% or less correct on the CEKI exam, while less than 3% scored above 80% correct.

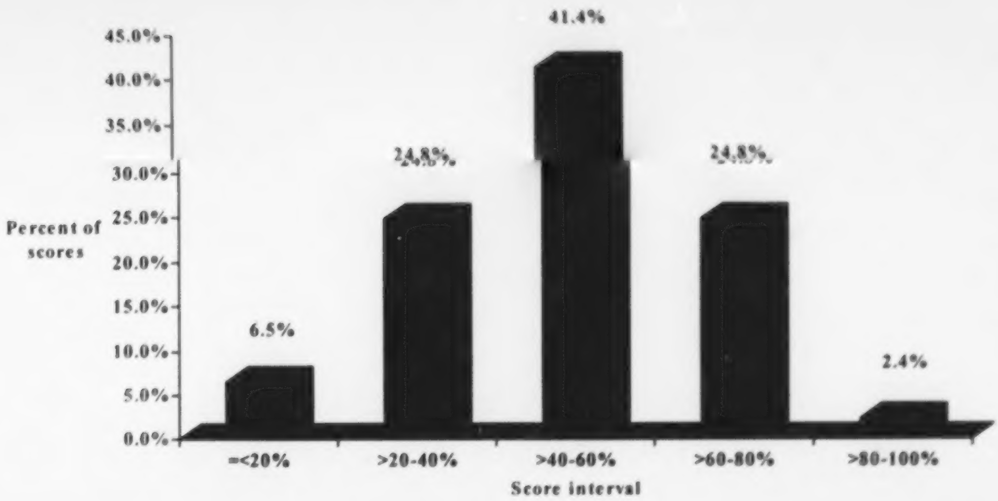

Figure 4. Distribution of grouped scores on the exam portion of the CEKI ($\underline{n}$ = 169).

On the individual components of the CEKI exam, students scored the highest percentage of correct answers on the Internet and general knowledge sections, and lowest on the computer programming section. Overall, scores for the database, spreadsheet, word processing, and programming exam sections were less than 50% correct (Figure 5).

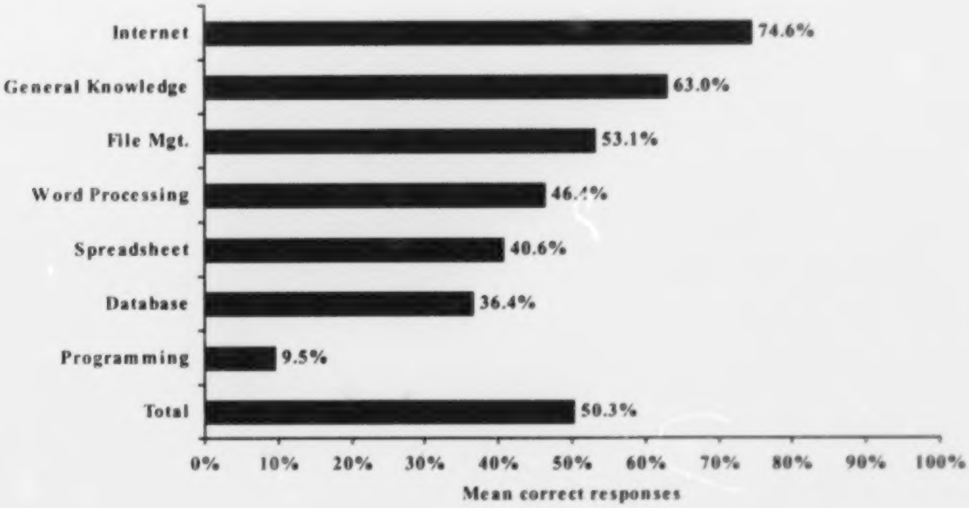

Figure 5. Mean scores on the CEKI exam, by section and total ($\underline{n}$=169).

The relationships between selected respondent demographic and computer-related characteristics and scores on the CEKI exam and computer self-efficacy ranged from negligible to moderate, using the descriptors suggested by Davis (1971). As shown in Table 1, age and gender had negligible correlations with CEKI exam scores, while grade point average (self-reported) and the number of computer courses completed had moderate, positive correlations with CEKI exam scores. All remaining variables, including computer self-efficacy, had low, positive correlations with CEKI exam scores.

College classification, having completed a computer course, and self-reported grade point average all had negligible correlations with computer self-efficacy. The extent to which the respondents felt they had used computers in their college courses had a moderate positive correlation with computer self-efficacy, explaining 24% of the variance. The remaining variables had low, positive correlations with computer self-efficacy.

Table 1. Relationship between selected variables and CEKI exam scores and computer self-efficacy.

Variable	CEKI exam score	CSE
Age	-.01 (n=166)	-.10* (n=163)
Gender[a]	-.02 (n=168)	.14* (n=165)
College classification	.15* (n=169)	.01 (n=166)
Completed a computer course[b]	.27* (n=169)	.09 (n=166)
Number of computer courses completed[c]	.36** (n=169)	.23* (n=166)
Number of topics studied in computer courses[c]	.22* (n=169)	.29* (n=166)
Extent of perceived college computer use	.29* (n=147)	.49** (n=146)
Own a computer[d]	.20* (n=168)	.20* (n=165)
Grade point average (GPA)	.31** (n=167)	.01 (n=164)
Computer self-efficacy (CSE)	.29* (n=166)	1.0 (n = 166)

[a] Coded as female = 0; male =1. [b] Coded as no = 0; yes =1. [c] Includes respondents *not* completing a computer course. [d] Coded as no = 0; yes = 1. *= low association; **= moderate association (Davis, 1971).

Conclusions

The students participating in this study reported a variety of computer-related experiences. Almost two-thirds of the students owned a computer, and nearly 80% had completed one or more computer use courses. Yet, significant percentages (from 24% to 66%) of respondents had never received formal instruction in each of the eight computer areas studied. Thus, it was concluded that students enrolled in these upper-division agriculture courses have not participated in a common core of educational experiences related to the most commonly used computer applications.

The respondents reported that, of four common computer applications, word processing was the only application they were required to use "fairly often" or "often' in the courses they had completed at this university. This is congruent with the findings of Brown and Kester (1993) who posited that students tended to forget many of the skills learned in introductory computer courses because these skills are not used in subsequent college courses. It appears that courses at this university do not require a wide variety of computer tasks.

The students felt they had the highest levels of skill in word processing, electronic mail, and Internet use, with over 50% rating their abilities as above average. According to a study by Johnson, Ferguson, Vokins, and Lester (2000), these are the three categories of computer use tasks most commonly required in undergraduate agriculture courses. As would be expected, students seem to develop confidence in those abilities that are most commonly required and used.

A majority of students felt they had average or above average skills in file management, spreadsheet use, and presentation graphics. However, a significant minority of students felt their skills were below average in spreadsheet use (27%) and presentation graphics (30%), while a majority of students rated their database and programming skills as below average. According to Johnson et al. (2000), these are four of the areas of computer use least commonly required in undergraduate agriculture courses, again supporting the hypothesized relationship between use (or lack of use) and confidence.

For the overall group, the mean CSE score was 3.14, indicating an average level of computer self-efficacy. Based on these findings, it was concluded that most students are somewhat confident of their overall computer skills, especially those involving the more common applications. However, a significant percentage of students lack confidence in both their overall computer abilities and in specific areas.

The mean score on the 35-item exam section of the CEKI was 17.6 (50.3% correct). Almost three-fourths (72.7%) of the students scored 60% or less, with nearly one-third (31.3%) scoring 40% or less. Conversely, only 2.4% scored above 80% on the CEKI exam. Thus, it was concluded that students enrolled in these upper-division agriculture classes vary widely in computer knowledge, with many having a fairly low level of computer knowledge.

Students scored highest on the Internet (74.6% correct), general computer knowledge (63.0% correct), and file management (53.0% correct) sections of the CEKI exam. The mean percentage of correct responses for each of the four remaining sections of the exam was less than 50%, with a high of 46.4% for word processing and a low of 9.5% for programming. Based on these results, it was concluded that, with the possible exception of Internet use, students were deficient in their knowledge of all areas covered by the CEKI exam. (Note: Although scores were especially low in the computer programming area, the researchers acknowledge that this is not an essential area of computer knowledge for the vast majority of students or agricultural employees.)

While all variables except age and gender had a low to moderate correlation with scores on the CEKI exam, none was a particularly robust predictor, with the best (number of computer courses completed) explaining only approximately 13% of the variance in scores. The variable computer self-efficacy explained less than 9% of the variance in CEKI exam scores, indicating that students in these upper-division agriculture courses are not very good judges of their own computer abilities. This is in contrast to previous research which found a substantial correlation ($\underline{r} = .67$) between computer self-efficacy and CEKI exam scores for students enrolled in selected freshman-level agriculture courses (Johnson et al.,1999)

The extent of perceived college computer use was the best predictor of computer self-efficacy, explaining 24% of the variance. This finding offers some support for the hypothesis that students tend to develop confidence in those computer skills that they use most frequently. On the other hand, students who had more confidence in their computer skills may simply be more likely to have used these skills in their courses.

Recommendations

Research concerning the computer experiences, computer self-efficacy, and computer knowledge of students in this College should be continued and expanded. In particular, this study should be replicated with a representative sample of graduating agriculture majors. If future studies produce similar results, the following actions are recommended.

First, a computer applications course requirement should be established for all students entering the College. Students should be required to complete this course during their first year of enrollment. However, because some students do appear to have an adequate level of computer knowledge, a performance testing option should be available whereby students can test out of the computer course requirement.

Second, deliberate, systematic efforts should be made to more fully integrate required computer use into courses throughout the College. The results of this study and a separate study by Johnson et al. (2000) indicate that undergraduate agriculture courses tend to require limited student computer use with most required tasks being drawn from a narrow range of fairly low-level computer skills. If agriculture students are to gain the level of computer proficiency desired by employers (Davis, 1997; Johnson et al.,1995; Langlinas, 1994; Monk et al.,1996), it seems reasonable that students must first learn these skills and then tasks requiring use of these skills must routinely be incorporated in subsequent courses. Experimental or quasi-experimental research should be conducted to determine the effects of required computer activities on the development of student computer skills and computer self-efficacy.

Finally, researchers and educators in other universities are encouraged to conduct similar studies. Such research will provide information necessary to make sound decisions concerning computer education courses and requirements.

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Computer Experiences, Self-efficacy and Knowledge of Students Enrolled in Selected Upper-division University Agriculture Courses

A Critique

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Many educators believe that, eventually, students will enter college with all of the computer knowledge and experience needed. What was not considered was that as technology changed the skills changed. As students developed more skills before college matriculation, the "bar was raised" requiring additional skills to be taught in college. The authors have undertaken one of the better studies to investigate the experience that students have in using computers, hopefully giving guidance to educators as they make decisions about computer education.

This study is based on a sound understanding of the literature; the researchers used appropriate methodology in an appropriate manner. The students were enrolled in several upper division courses, making the results more broadly applicable. The results are reported in a sensible, clear and easily-understood manner. The use of charts and graphs is very helpful (computer skills can even enhance scholarly papers!). The authors also did a good job in presenting enough data to allow the reader to answer the research questions without over-emphasizing the low and negligible correlations. The conclusions and recommendations are based on the findings (with, perhaps, a bit too much detail).

Three recommendations are posited. The need for a computer applications course requirement is probably supported by the findings, but sometimes faculty jump quickly to "another course" to address a competence deficiency. The authors do suggest a performance testing option. Should students be required to show competence before admission to the college? Should credit be given for learning word processing? Should universities be in this business?

The second recommendation addresses the incorporation of computer applications into existing courses. YES!! Students are reasonable people. When shown by action that they must have certain competence, they will expend the effort to learn (as opposed to the "you will need this some day" promise). Principles of teaching and learning reinforce the need to incorporate computer skill development into relevant course work. What is the role of agricultural education in assisting other faculty to achieve this recommendation? How do college teachers learn to incorporate computer use into their courses?

The researchers also recommend that others conduct similar studies. Perhaps so, but let's not over-study this issue. Perhaps we should spend more time on recommendation two and test the results. Do we know what an acceptable CEKI score is? Does that score vary by college major? Can agricultural education be the leaders in seeing that students do acquire computer skills for their chosen field of study?

Computer Tasks Required in Selected Undergraduate Agriculture Courses

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James A. Ferguson
Nancy G. Vokins
Melissa L. Lester
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Abstract

Faculty members in a land-grant college of agriculture were surveyed to determine the computer tasks required of students enrolled in selected undergraduate courses (n = 63). Over 50% of the courses required students to complete one or more tasks in the areas of word processing, Internet use and electronic mail. Less than 50% of the courses required any use of spreadsheets, databases, computer graphics, specialized software, or completion of miscellaneous computer tasks. The typical course required students to complete 5.0 (Mdn) computer tasks. The three individual computer tasks required in 50% or more of the courses were to: (a) type a lab or project report, (b) receive electronic mail from the instructor, and (c) search the Internet for information on a specific topic. Sophomore- and senior-level courses tended to require the most computer tasks (Mdn = 8.0), while junior-level courses required the least (Mdn = 3.0). Faculty members indicated plans to maintain or increase the number of required computer tasks over the next two to three years, especially in Internet and electronic mail use. Faculty demographics and course-related variables were not good predictors of either current or planned levels of required student computer use.

Introduction

Computers play an important and ever increasing role in modern agriculture. In follow-up studies, university agriculture graduates consistently rate computer skills as being important to career success (Andelt, Barrett, & Bosshamer, 1997; Graham, 1997; Radhakrishna & Bruening, 1994). Yet, Heyboer and Suvedi (1999) found that recent (1993 - 1998) graduates of the College of Agriculture and Natural Resources at Michigan State University felt they had received less than satisfactory preparation in computer use, rating computers as the area in which they were least prepared for employment.

Agricultural employers also place significant importance on computer skills, with more than 80% indicating that computer skills are either an 'important" or "very important" factor considered when making employment decisions (Monk, Davis, Peasley, Hillman, & Yarbrough, 1996). Thus, university agriculture programs must ensure that graduates are competent in computer use (Davis, 1997; Johnson, Von Bargen, & Schinstock, 1995; Langlinas, 1994).

In a Cornell University study, Monk et al. (1996) determined that agriculture graduates should be proficient in word processing, presentation graphics, spreadsheet analysis, database management, technical graphics, Internet use and electronic mail. Further, students should be sufficiently comfortable with computer and information technologies so they can develop new computer skills throughout their careers. Researchers at the University of Wisconsin-Stout also found that abilities in these same areas are important for students in a wide variety of majors (Furst-Bowe et al., 1995).

Recognizing the importance of computers in agriculture, Bekkum and Miller (1994) surveyed deans at 71 land-grant colleges of agriculture to determine the strategies used to ensure that graduates were proficient in computer use. Of the 59 deans responding, less that one-half (44.1%) reported a college-wide computer education requirement. Further, 11 (18.6%) of the deans believed that, in the future, less time would be required for basic computer skill development, since students would have developed these skills prior to entering college. According to Kieffer (1995), many university faculty and administrators accept the premise that students enter college already possessing basic computer skills.

Johnson, Ferguson, and Lester (1999) tested this premise by assessing the computer experiences, self-efficacy and knowledge of students ($\underline{N}$ = 175) enrolled in three freshman-level agriculture courses at a land-grant university during the fall 1998 semester. The researchers concluded that the students did not have a common core of computer experiences, lacked confidence in their computer skills, and had a low level of computer knowledge (as indicated by a mean score of 38.8% correct on a 35-item multiple choice exam). In a similar study, Gordon and Chimi (1998) found that students entering a college of business lacked sufficient computer knowledge and recommended continuation of the introductory computer literacy course requirement.

Donaldson, Thomson, Whittington, and Nti (1999) recommended that colleges of agriculture include computer applications in all introductory courses so that students would be prepared to use computer technology throughout their undergraduate years. Johnson et al. (1999) noted a substantial positive correlation ($\underline{r}$ = .67) between computer self-efficacy and computer knowledge and hypothesized that, while students recognized their lack of computer skills, they were not motivated to improve because computer skills are not regularly required in undergraduate courses. A separate study of 169 upper-division agriculture students provided support for this hypothesis since, according to Johnson, Ferguson and Lester (2000), word processing was the only computer task students reported as being required "often or fairly often" in their college courses. Brown and Kester (1993) posited that students tended to forget many of the skills learned in introductory computer courses because they did not use these skills in subsequent courses. Given the importance that both graduates and employers place on computer skills, and the suggestion that computer skills decay because of disuse in subsequent courses, a clear need existed to examine the course-related computer tasks required of undergraduate agriculture majors. The results of this study would provide information necessary for enhancing the computer experiences and skills of undergraduate students.

Objectives

The purpose of this study was to describe required student computer use in undergraduate agriculture courses in a land-grant university. Specific objectives were to determine:

1. The computer tasks required in undergraduate agriculture courses, by course level and overall;

2. Instructors' plans for required computer use in undergraduate agriculture courses over the next two to three years; and
3. The relationship between selected faculty and course variables and levels of current and planned required student computer use.

Methods

The population for this descriptive study consisted of all undergraduate agriculture courses (excluding special problems, special topics, laboratory courses, and the College computer applications course) taught in a mid-south land-grant university during the 1999 calendar year ($\underline{N} = 111$). The courses were identified using official records supplied by the dean's office. After deleting courses taught by instructors no longer employed by the university, an accessible population of 103 courses (taught by 63 individual faculty members) was identified. The sample of courses ($\underline{n} = 63$) consisted of all 34 courses taught by faculty teaching only one course during the year, plus one randomly selected course for each of the 29 instructors teaching multiple courses during the year. The resulting sample closely approximated the accessible population of courses with regard to course level and department.

The data were collected using a survey instrument developed by the researchers, based, in part, on previous research that sought to identify essential computer skills (Davis, 1997; Furst-Bowe et al., 1995; Kieffer, 1995; Monk et al., 1996). In order to focus each respondent's attention on the specific course selected, the alpha code, number and title of the course were hand-printed once on each cover letter and in three places on each survey instrument.

In Part One, the respondents were instructed to indicate whether or not students enrolled in the identified course were required to complete 34 specific computer tasks (grouped into eight categories), by circling either a "Yes" or a "No" to the right of each task. In addition to the specific tasks listed, each category of computer use contained an "Other (please specify):" response option. In Part Two, the respondents were asked to indicate their plans for required student computer use in the identified course over the next two to three years. This section listed seven broad areas of computer use with the response options of: "Decrease use," "Maintain current use," or "Increase use." Part Three contained four demographic items related to academic rank, teaching experience and appointment, and self-perceived computer skills of the instructors. A blank section was provided for additional written comments from the respondents.

The survey instrument was examined for face and content validity by a panel of faculty consisting of representatives from each department within the College and judged to be valid. In order to establish instrument reliability, five agriculture faculty members at two land-grant universities completed the instrument twice (at two- to seven-week intervals) for specific, identified courses which they had recently taught. For Part One and Part Two, agreement percentages of 95% and 86%, respectively, were obtained. The reliability of Part Three was not assessed since, according to Salant and Dillman (1994), responses to non-sensitive, demographic items are subject to little measurement error.

The survey instruments and cover letters were hand delivered to departmental offices and placed in faculty mailboxes. After two follow-up contacts, usable responses were received from 58 of 63 faculty members, for a 92.1% response rate.

Results

The typical faculty respondent was a full professor (43.1%) with 10 or more years of university teaching experience (60.3%). A majority (76.8%) of the faculty reported that a third or less of their appointment was in resident instruction. When comparing themselves to other faculty in the College, a majority (60.3%) of respondents rated their computer skills as average, 24.1% rated their skills as above average, and 15.5% rated their skills as below average.

One or more tasks in word processing, Internet use, and electronic mail were required in more than one-half of all the undergraduate agriculture courses studied. Conversely, less than one-half of the courses required any use of spreadsheets, databases, computer graphics, specialized software, or completion of miscellaneous computer tasks. Only three individual computer tasks were required in more than 50% of courses: type a lab or project report (63.8%), receive electronic mail from the instructor (58.3%), and search the Internet for information on a specific topic (53.4%). Of the 34 identified computer tasks, 26 were required in less than 25% of courses, while 17 were required in less than 10%. None of the 58 courses included assignments requiring students to create a spreadsheet macro, do database programming, or use a computer-assisted drafting program.

In addition to the 34 specific computer tasks listed on the survey, a number of course instructors wrote in additional tasks in the "Other (please specify):" blanks. A majority of these were in the word processing area, with the most frequent (n = 4) being to type a memo. The most commonly identified special application software was for statistical analysis, either SAS® or JMP® (n = 3). Table 1 summarizes the computer tasks required in the 58 courses, by level and overall.

Table 1. Computer Tasks Required in Selected Undergraduate Agriculture Classes, by Level and Overall.

Computer area Computer task	Course level Fresh. (n=7)	 Soph. (n=8)	 Junior (n=19)	 Senior (n=24)	 Overall (n=58)
	Percent requiring area/task				
Word Processing	**71.4**	**87.5**	**47.4**	**91.7**	**74.1**
Type a lab or project report.	57.1	62.5	36.8	87.5	63.8
Type a formal research paper.	28.6	25.0	15.8	37.5	27.6
Type a business letter.	0.0	0.0	5.3	12.5	6.9

Table 1. (cont.)

Computer area Computer task	Course level				
	Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
	Percent requiring area/task				
Prepare a brochure or newsletter.	0.0	0.0	10.5	0.0	3.4
Other	42.9	25.0	5.3	8.3	13.8
Electronic Mail	**57.1**	**75.0**	**47.4**	**58.3**	**56.9**
Receive electronic mail *from* you.	57.1	75.0	42.1	58.3	55.2
Send electronic mail *to* you.	57.1	50.0	31.6	41.7	41.4
Submit course assignments as "attached files" using e-mail.	14.3	12.5	5.3	8.3	8.6
Participate in an e-mail course discussion group or listserve.	0.0	0.0	10.5	4.2	6.9
Other	14.3	12.5	5.3	4.2	6.9
Internet and World Wide Web	**85.7**	**62.5**	**57.9**	**75.0**	**69.0**
Search the Internet for information on a specific topic.	57.1	50.0	36.8	66.7	53.4
Access a *homepage* developed for your course.	42.9	37.5	36.8	29.2	34.5
Download data to disk or hard-drive from the Internet.	0.0	25.0	36.8	25.0	25.9
Participate in a "threaded discussion group" for your course.	0.0	0.0	5.3	4.2	3.4
Create a Web page.	14.3	0.0	5.3	0.0	3.4
Other	0.0	0.0	0.0	0.0	0.0
Spreadsheets	**0.0**	**50.0**	**15.8**	**54.2**	**34.5**
Create charts and/or graphs.	0.0	37.5	5.3	50.0	27.6
Create a new spreadsheet.	0.0	25.0	5.3	45.8	24.1
Enter data into an existing spreadsheet.	0.0	25.0	10.5	37.5	22.4

Table 1. (cont.)

Computer area	Course level				
	Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
Computer task	Percent requiring area/task				
Write a spreadsheet formula that performs a single mathematical operation.	0.0	25.0	5.3	37.5	20.7
Write a single spreadsheet formula that performs a series of mathematical operations.	0.0	12.5	5.3	29.2	15.5
Use spreadsheet functions (e.g. *IF, MAX, MIN,* etc.*)*.	0.0	0.0	0.0	20.8	8.6
Use spreadsheet database functions (e.g. S*ort, Query)*.	0.0	12.5	0.0	16.7	8.6
Create a spreadsheet macro.	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	4.2	1.7
Databases	**0.0**	**25.0**	**10.5**	**16.7**	**13.8**
Create a new database.	0.0	12.5	10.5	16.7	12.1
Enter data into an existing database.	0.0	12.5	5.3	8.3	6.9
Sort and/or query a database.	0.0	0.0	5.3	8.3	5.2
Create a database report.	0.0	12.5	5.3	4.2	5.2
Do database programming.	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0
Computer graphics	**14.3**	**12.5**	**21.0**	**37.5**	**25.9**
Create materials using presentation graphics software (for example, *Microsoft Powerpoint, Corel Presentations, Harvard Graphics*, etc.).	14.3	12.5	21.0	33.3	24.1
Make drawings using computer-assisted drafting program (for example, *AutoCAD, TurboCAD, AutoSketch*, etc.)	0.0	0.0	0.0	0.0	0.0

Table 1. (cont.)

Computer area Computer task	Fresh. (n=7)	Soph. (n=8)	Junior (n=19)	Senior (n=24)	Overall (n=58)
	Percent requiring area/task				
Other	0.0	0.0	0.0	8.3	3.4
Miscellaneous Tasks	**28.6**	**50.0**	**21.0**	**50.0**	**37.9**
Conduct a literature search using *Agricola, ERIC, FirstSearch* or similar database.	28.6	25.0	10.5	33.3	24.1
Use a computer simulation program.	0.0	25.0	5.3	16.7	12.1
Transfer files from a personal computer to a mainframe computer (or *vice versa*) using file transfer software (for example, *Telnet or Windows FTP*).	0.0	12.5	10.5	4.2	6.9
Use a financial management program such as *Quicken*.	0.0	0.0	0.0	8.3	3.4
Write a computer program.	0.0	0.0	0.0	4.2	1.7
Other	0.0	12.5	0.0	4.2	3.4
Specialized Applications	**0.0**	**25.0**	**10.5**	**25.0**	**17.2**

Overall, the typical undergraduate agriculture course required 5.0 (Mdn) computer tasks. Sophomore- and senior-level courses required the greatest number of computer tasks (Mdn = 8.0), while junior-level courses required the least (Mdn = 3.0). At all levels, the typical course required at least one Internet-related computer task. Courses at the freshman-, sophomore-, and senior-levels also typically required at least one task in both word processing and electronic mail. One-half of all sophomore- and senior-level courses required students to complete one or more spreadsheet tasks. Little use of databases, computer graphics, or specialized applications was required at any level (Table 2).

The instructors were asked about their plans for required student computer use in the selected courses over the next two to three years. The majority of instructors planned to either maintain or increase the level of required student use in each of the seven computer areas studied (instructors were not asked about future plans for "miscellaneous tasks"). Databases and specialized applications were the only areas where any faculty reported plans to decrease required use; however, this planned decrease was more than offset by instructors planning to increase required student use in these areas. Overall, the largest percentage of planned increase in required student use was in two of the computer areas (Internet and electronic mail) where the highest level of current required use existed. A minority (<40%) of respondents planned to increase required student use of word processing, spreadsheets, computer graphics and specialized applications over the next two to three years.

The relationship between current and planned required student use in each area ranged from negligible to moderate (Davis, 1971), explaining less than 10% of the variance in planned use for any of the computer areas. Table 3 summarizes the data related to future plans for required student computer use.

Table 2. Number of Required Student Computer Tasks per Course by Area, Total, Level and Overall.

	Course level														
	Freshman (n=7)			Sophomore (n=8)			Junior (n=19)			Senior (n=24)			Overall (n=58)		
Area	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	Mdn
Word processing	1.29	.95	2.0	1.12	.64	1.0	0.74	1.05	0.0	1.46	.72	1.5	1.16	.89	1.0
Electronic mail	1.43	1.40	2.0	1.50	1.07	2.0	0.94	1.35	0.0	1.17	1.17	1.0	1.17	1.23	1.0
Internet	1.14	.90	1.0	1.12	.49	1.0	1.21	1.27	1.0	1.25	1.03	1.0	1.21	1.09	1.0
Spreadsheet	0.0	—	0.0	1.38	1.77	1.0	0.32	.95	0.0	2.42	2.72	1.5	1.29	2.17	0.0
Database	0.0	—	0.0	0.38	.74	0.0	0.26	.93	0.0	0.38	1.01	0.0	0.29	.88	0.0
Computer graphics	0.14	.38	0.0	0.12	.35	0.0	0.21	.42	0.0	0.42	.58	0.0	0.28	.49	0.0
Miscellaneous tasks	0.29	.49	0.0	0.75	.89	0.5	0.26	.56	0.0	0.71	.81	0.5	0.52	.73	0.0
Specialized applications	0.0	—	0.0	0.25	.46	0.0	0.11	.32	0.0	0.25	.44	0.0	0.17	.38	0.0
Total	**4.28**	**2.69**	**5.0**	**6.62**	**4.34**	**8.0**	**4.05**	**4.84**	**3.0**	**8.04**	**4.47**	**8.0**	**6.08**	**4.68**	**5.0**

Table 3. Instructors' Plans for Required Student Computer Use in Selected Undergraduate Agriculture Courses over the Next Two to Three Years.

		Level of Required Use			
Area of Computer Use	n	Decrease %	Maintain %	Increase %	r[a]
Word processing	57	0.0	61.4	38.6	-.23
Electronic mail (e-mail)	57	0.0	38.6	61.4	.06
Internet or World Wide Web	56	0.0	26.8	73.2	.22
Spreadsheets	56	0.0	69.6	30.4	.30
Databases	55	5.5	87.3	7.3	.14
Computer graphics	55	0.0	63.6	36.4	-.26
Specialized applications	55	1.8	69.1	29.1	-.10

[a]Spearman rho correlation between plans for required use and level of current use.

The final objective was to determine the relationship between selected faculty and course demographic characteristics and overall current and planned levels of required student computer use. For this objective, current use was calculated as the total number of computer tasks currently required in each course. Planned use was calculated by summing each individual's responses to the seven items related to planned student computer use over the next two to three years.

As shown in Table 4, both academic rank and years of university teaching experience had low, negative relationships with current level of required student computer use. Self-perceived computer skills and the level of the course both had low positive relationships with current level of required student use. Years of university teaching experience, percentage teaching appointment and level of course had low, negative correlations with planned required student computer use. Finally, the relationship between current level of required student computer use and planned use was negligible.

Table 4. Relationship Between Faculty and Course Characteristics and Current and Planned Levels of Required Computer Use.

Faculty/course characteristic	Current use (n= 58)	Planned use (n=52)
Academic rank[a]	-.25[b]	.06[b]
Years of university teaching experience	-.27[c]	-.12[b]
Annual FTE teaching appointment	.05[b]	-.13[b]
Self-perceived computer skills[d]	.21[b]	.07[b]
Level of course[e]	.29[b]	-.18[b]
Current level of required computer use		-.09[b]

[a]Coded as: 1 = assistant professor, 2 = associate professor, 3 = professor. [b]Spearman rho. [c]Pearson product-moment. [d]Coded as: 1 = below average, 2 = average, 3 = above average. [e]Coded as: 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior.

Conclusions

The typical undergraduate agriculture course in this study required a median of 5.0 different computer tasks, with three of these being to: (a) type a lab or project report, (b) receive electronic mail from the instructor and (c) search the Internet for information on a specific topic. Of the 34 computer tasks identified in the literature (Davis, 1997; Furst-Bowe et al., 1995; Kieffer, 1995; Monk et al., 1996) as being important for academic and career success, only eight were required in 25% or more of courses. In addition to the three previously listed, the remaining five tasks were to: (a) send electronic mail, (b) access a course homepage, (c) download data from the Internet, (d) create charts or graphs using a spreadsheet, and (e) type a formal research paper. Fewer than one-half of the courses studied required students to complete any activities involving spreadsheets, databases, computer graphics, specialized applications or miscellaneous computer tasks. Thus, it was concluded that the courses in this study tended to require limited student computer use with most required tasks being drawn from a narrow range of fairly low-level computer skills.

When required computer tasks were analyzed by course level, it was apparent that sophomore- and senior-level courses required the widest variety of computer tasks. Senior-level courses also tended to require more advanced tasks than did courses at lower levels. This trend was particularly true for the spreadsheet area where a significant minority of senior-level courses required students to create a new spreadsheet, write simple and nested spreadsheet formulas, and use spreadsheet functions. In contrast, junior-level courses required both the fewest and the lowest level of computer tasks. Courses at the freshman and sophomore levels tended to require tasks primarily from the word processing, electronic mail, and Internet areas, although a sizable minority of sophomore-level courses did require some spreadsheet and database use, while no freshman-level courses did.

The instructors indicated that, over the next two to three years, they planned to either maintain or increase the current level of required student computer use in each of the seven computer areas studied . The areas of greatest planned increases were in Internet and electronic mail use, with over 60% of instructors planning increased course requirements. A minority (<40%) of instructors also planned to increase required student use of word processing, computer graphics, spreadsheets and specialized applications. The relationships between current and planned use for each of the seven computer areas as well as total current and total planned use were negligible to low. Thus, current required student use was not an especially good predictor of future plans for required student use.

The relationships between faculty and course characteristics and current and planned levels of required computer use were negligible to low, with no characteristic explaining as much as 10% of the variance. It appears that the faculty and course characteristics included in this study were not robust predictors of present or planned required student computer use.

Recommendations

The recommendations arising from this study are obvious – it is the implementation which may prove problematic. If students are to acquire the wide range of computer skills which employers and graduates consistently indicate are important, students must first learn these skills and then tasks requiring use of the skills must be incorporated into undergraduate agriculture courses. Thus, the major recommendation arising from this study (and supported by previous research by Johnson et al.,1999, 2000) is for the College to develop a plan for systematically integrating computer education activities into the fabric of the undergraduate agriculture curriculum.

Such a plan must begin with the implementation of a required computer-use course for students entering the College. In a focus group interview with undergraduate agriculture students at Cornell University, Davis (1999, p. 71) reported that, "There was unanimous agreement that professors assume students have specific software skills without presenting any support or training. This was a source of considerable frustration and stress for many students." Based on the previous findings concerning the computer experiences, self-efficacy and knowledge of undergraduate agriculture students in this College (Johnson et al., 1999, 2000), a foundation of computer skills must be in place before increased computer course requirements can be implemented. Failure to do so would set many students up for failure.

Once students have learned a common core of computer skills, these skills should be used and expanded on in subsequent undergraduate agriculture courses. While all instructors should be encouraged and assisted in integrating computer requirements into their courses, establishment of a number of "computer-intensive" courses within the College should be considered. Assignments in these courses should be designed to require a variety of higher level computer skills that enhance the learning and application of course subject matter. In order to be effective, these courses would need to be implemented at each level (freshman through senior) and be required for graduation. This would prevent the students most in need from avoiding enrollment in these courses. The details of this or other plans should be determined by the faculty, possibly through an *ad hoc* committee named for this purpose or by a standing committee, such as the College curriculum committee.

Finally, it appears that many instructors do plan to increase required student computer use in their courses on an individual basis. This trend should be encouraged; however, development of a systematic, college-wide plan would help ensure that such increases are not simply more required use of the same subset of lower level computer tasks presently emphasized. Rather, faculty should be encouraged and enabled to incorporate a variety of higher level computer tasks into their courses. In addition, development of a systematic plan for student computer use within the College would ensure that all students are required to learn and use the variety of computer skills identified as being important for career entry and advancement.

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Computer Tasks Required in Selected Undergraduate Agriculture Courses

A Critique

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This study is obviously highly related to the previous study. The purpose of the study focuses on helping to answer the questions raised in the recommendation of the other paper. We need to know what computer tasks are needed to succeed in undergraduate courses. Refer to the other critique for general comments about the literature review and methodology.

An aside from the actual content of this study – how often do faculty in any curriculum actually think about "who teaches what" or "in what course(s) will students acquire the competencies we want them to gain?" The procedures used in this study are applicable in many content areas. Agricultural education is not an exception, and agricultural education should give leadership to the entire college in this endeavor.

Specifically, the authors report the computer tasks that are required in 63 selected courses. One interesting phenomenon that was pointed out by the researchers is that the use of computer tasks across a four-year program may not be additive; "junior" courses required fewer computer tasks than "sophomore" courses. In addition, instructors' plans for increasing the required computer tasks in courses were in tasks that are already used frequently. The general conclusion could be that instructors are comfortable with certain tasks, and therefore will increase the use of those tasks rather than adding new areas of computer competence. The relationships between instructor/course characteristics and current and planned computer list provided no surprising results.

Only one major recommendation was posited, with variations on that theme. Faculty must systematically identify computer tasks that must be learned and taught, and then must systematically examine the curricula to determine in what courses and at what level those skills should be incorporated into the curricula. What role should agricultural education play in helping colleges implement that recommendation? How do college faculty outside of teaching/learning fields acquire the necessary skills to examine the curricula and plan for needed change? And then how do faculty acquire skill in effectively incorporating computer skills into their courses? Historically, faculty do what they know best and use skills that fall within their comfort zone. Likewise, others incorporate new skills and technology inappropriately (converting boring transparencies into boring PowerPoint presentations). How can agricultural education help faculty colleagues avoid both of those pitfalls?

College of Agriculture Faculty Perceptions Of Electronic Technologies in Teaching

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Abstract

Distance education continues to advance at a rate that is impressive to some in higher education, and frightening to others. The relationships between and among learners, educational institutions, agribusinesses, and commodity groups are changing. The roles each of these stakeholders will play in the future are unclear. Educational institutions are patenting and marketing products. Agribusinesses are providing educational materials and experiences. Commodity groups are conducting research. Words like "E-Learning" and "EduCommerce" are entering the popular vernacular. Consumers and producers have ever-greater expectations that focused, timely, and accurate information will be delivered just in time, anytime, and anywhere.

The ability of an organization to adapt to these changes will be influenced by at least three factors, a) the knowledge, skills, and abilities of its staff, b) the amount of importance the staff places on the role of these technologies to accomplish teaching and learning, and c) the availability of high quality facilities, equipment, technical support, and training. The purpose of this study was to provide baseline data and focus for the improvement of instruction in a college of agriculture through an analysis of these three factors.

The study employed both quantitative and qualitative research methods. Survey research methods were used to collect and analyze quantitative data. All teaching faculty in the College of Agriculture were included, and 263 of the 315 instruments mailed were returned. The effective response rate was 83.5%. The constant comparative method was used to analyze open-ended questions yielding qualitative data.

Faculty members were male, (86.7%) and over 40 (66.1%), with 38.8% between 51 and 65. In general, they agreed that these technologies could make a valuable contribution to the learning process, that they should be used in all classes, those taught on- as well as off-campus, and that technology will change how we teach in the next five years.

About one-half of the respondents reported having a course website, and about one-half of those managed the website themselves. Most lacked experience in teaching learners at a distance, and they were much more confident in their technical competence than they were in their methodological ability to use modern technologies in their teaching.

All respondents perceived training and assistance in the use of instructional technologies to be less available than equipment and facilities. Those faculty members who had not participated in distance education perceived the level of support as lower than those who had taught classes at a distance. They did not perceive the climate to be supportive of the use of these technologies.

Introduction

In the 1997-98 academic year, just over one third of the approximately 5,000 postsecondary institutions in the U.S. offered distance education courses, while another fifth planned to do so (U. S. Departments of Education, National Center for Education Statistics, 1999). "Major organizational changes and new developments in higher education are being accelerated by dynamic advances in global digital communications and increasingly sophisticated learning technologies…Barriers to accessing higher education learning opportunities are being reduced globally because of improved learning technologies" (Hanna, 1999, p. 19).

To prepare students successfully in Colleges of Agriculture, educators must incorporate the use of digital information technologies. "Educators must help all students become adept at distanced interaction, for skills of information gathering from remote sources and of collaboration with dispersed team members are as central to the future American workplace as learning to perform structured tasks quickly was to the industrial revolution" (Dede, 1996, p. 30). In consideration of this incredible growth, what will be the impact of teaching using technology on faculty responsibility? Is teaching students through any or all distance education methods really nothing more than adapting traditional classroom approaches? What are the attitudes and barriers to using technologies often associated with distance education?

Theoretical Framework

Research in the field of distance education has recognized the need for a change and modification of the faculty role in teaching at a distance (Wedemeyer, 1981; Beaudoin, 1990; Dillion & Walsh, 1992; Prudy & Wright, 1992). "It is not that the technology underpinning distance education drives the system but rather that fundamental changes in teaching style, technique, and motivation must take place to make the new 'classrooms' of the present and future function effectively" (Prudy & Wright, 1992, p. 4).

Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Gunawardena, 1990; McNeil, 1990). "Attitudinal issues—how people perceive and react to these technologies—are far more important now than structural and technical obstacles in influencing the use of technology in higher education" (McNeil, 1990, p. 2). Other barriers stem from the lack of perceived institutional support (faculty rewards, incentives, training, etc.) for course conversion to distance education formats (Dillon & Walsh, 1992; McNeil, 1990; Wolcott, 1997; Olcott & Wright, 1995). "The accelerated development of distance education programs across American higher education will require a renewed commitment to its most important resource….faculty" (Olcott & Wright, 1995, p. 5).

Despite the fact that much of the literature in distance education discusses the importance of faculty, this group has been largely neglected by the research (Dillon & Walsh, 1992; Beaudoin, 1990). Beaudoin (1990) observed that

> [t]he emergence of increasingly student-centered learning activities in the 1970s facilitated by new instructional technology introduced in the 1980s is contributing to a dramatic evolution in faculty roles, and raises fundamental questions within the professoriate about how it will contribute to the teaching-learning process in the 1990s and beyond. (p. 21).

In the Dillon and Walsh (1992) metaanalysis of studies examining faculty attitudes toward distance teaching, only one examined issues of faculty members who did not offer one or more courses via distance education. The researchers wanted to capture the perceptions of the entire teaching faculty of the College of Agriculture regarding the instructional use of the technologies often associated with distance education.

Purpose and Objectives

The purpose of this study was to provide baseline data and focus for the improvement of instruction in a college of agriculture through the utilization of digital technologies used in teaching. The objectives were to:

1. Describe demographic variables of the teaching faculty.
2. Describe the level of competence among faculty using technology in teaching.
3. Describe the faculty members' perceptions of the value of these technologies to teaching and learning.
4. Determine the perceived quality of the infrastructure: that is the availability of equipment, facilities, and training related to the use of these technologies and the level of institutional support faculty members believe surrounds the use of these technologies.

Methods and Procedures

Population

The population for this study was all teaching faculty in the college of agriculture at a land grant university. A census of the population was surveyed. Department heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, a total of 331 faculty members with teaching appointments were identified by the Department Heads. There were sixteen of these faculty members who subsequently provided documentation that they did not posses teaching appointments. The population of teaching faculty numbered 315.

Instrumentation

The instrument used to collect data was a three-part questionnaire designed by the researchers. The instrument was four pages long and designed to be automatically scanned into a digital file by an optical character recognition (OCR) scanner. Part I of the questionnaire was designed to identify the selected personal and professional characteristics of the respondents and describe their current level of involvement in technology-mediated instruction. Six questions were devoted to demographic variables. Those included were gender, age, the number of courses the faculty member taught per year, the number of years the faculty member had been teaching, the tenure status of the faculty member (Non-Tenure Track, Tenure Track, Tenured), and their academic rank or title (Instructor, Lecturer, Assistant Professor, Associate Professor, Professor). An additional six questions were used to describe the respondents' current level of participation in technology-mediated instructional delivery strategies.

Part II consisted of 30 statements designed to measure objectives two through four. A five-point Likert-type response scale was employed. The response choices were: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neither Agree nor Disagree," 4 = "Agree," 5 = "Strongly Agree." The researchers considered the possibility that many of the faculty would not hold strong opinions on some statements due to a lack of information about, and or exposure to, these relatively new technologies. Reliability was established by calculating Cronbach's Alpha. The alpha for the 30 items in Part II of the questionnaire was .82.

Part III consisted of a three open-ended questions designed to provide an opportunity for the respondents to add their comments concerning the improvement of their use of distance education technologies.

A panel of five experts made up of faculty members from the Department of Agricultural Education, the Department of Educational Human Resource Development, and the Center for Distance Learning Research established content validity of the instrument. Selected faculty members from the colleges of Education and Liberal Arts completed a pilot test of the instrument. Minor changes in the instrument were made based upon evaluation of the pilot test and suggestions from the panel of experts.

Collection of Data

All teaching faculty in the college were sent a copy of the questionnaire along with a cover letter describing the project on November 5, 1999. The Associate Dean for Academic Programs signed the cover letter. Campus mail was used to reach those faculty members residing on-campus, and the U.S. Postal mail was used for those located off-campus. The researches chose to use a traditional paper instrument so as not to exclude those who would have difficulty responding with an online survey instrument.

Of the 315 survey instruments mailed, 196 were returned within two weeks, for an effective initial response rate of 62.2%. After three weeks, a reminder letter was sent to non-respondents along with a second copy of the survey instrument. A follow up e-mail reminder was sent to non-respondents four weeks after the initial mail out. Those non-responding teaching faculty without valid e-mail addresses were contacted via telephone. All non-respondents were contacted via telephone six weeks after the initial mailing, in some cases at home. In each case, they were encouraged to complete the survey and additional instruments were supplied upon request. In all, 263 survey instruments were returned for a final response rate of 83.5%. Survey and follow-up procedures were in accordance with those outlined by Dillman (1978).

Analysis of Data

Quantitative data were analyzed using SPSS® software version 9.0 for Windows. Descriptive statistics were calculated for each variable. Frequencies and percentages were used to summarize agreement or disagreement with each of the statements related to competence, value, and quality of infrastructure. An attempt to control non-respondent error was made by comparing the data from early and late respondents as suggested by Miller and Smith (1983). No significant differences were found between the groups.

The constant comparative method was used for the open-ended qualitative data analysis (Lincoln & Guba, 1985). This method describes four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. For the first stage, the researchers studied the open-ended responses to determine trends in the data. Each idea (unit) was initially listed, without placement into categories. The investigators drew upon tacit knowledge in making these initial judgments for early category formulation. Colored markers were used to differentiate respondent themes so that the data would remain in context and provide visual indications of emerging categories.

"The first rule of the constant comparative method is that while coding an incident for a category, compare it with the previous incidents in the same and different groups coded in the same category. This constant comparison of the incidents very soon starts to generate theoretical properties of the category....Thus the process of constant comparison stimulates thought that leads to both descriptive and explanatory categories" (Lincoln & Guba, 1985, p. 341). From this process, the researchers established categories across the data set. As the data analysis progressed, the researchers were able to combine and more specifically define categories based on overlying themes in the data. Once the categories emerged, fewer modifications were required as more data were processed. Delimiting the construction occurred as the data sources became saturated and the categories were integrated.

Findings

Part I: Characteristics and Level of Involvement

For reasons unknown to the researchers, one faculty member failed to report gender. Of the 262 respondents reporting, 228, or 86.7%, were male. Slightly more than one-third (33.9%) of the faculty members were less than 40 years old, while 38.8% were between 51 and 65 years of age and 5.3% were over 65. The average faculty member reported teaching 2.4 classes per year, was tenured (66.9%), and held the rank of full professor (58.2%).

Over one-half the faculty members (52.9%) reported having a website related to their course. Of these, 84.3% were described as simply enhancing the course, 15.0% were described as a required component of the course, and .7% (1 course) was described as being completely delivered via the website.

Almost exactly half the faculty with a course website (49.6%), administer that site themselves. Less than one-quarter (23.0%) assign a graduate assistant to the task. Almost as many (20.9%) use professional support staff. Most of these course websites reside administratively near the faculty member on their departmental servers (62.1%), and on university servers (21.4%). Faculty were almost evenly split on the software used to edit these websites with 32.2% using a text editor, and 28.1% using Microsoft Word. Only 4.8% use Microsoft FrontPage while 23.2% report using "other" software.

While many of the teaching faculty had websites, few had experience teaching learners at a distance. Only 1.1% had taught a course at a distance more than 10 times. Another 10.2% had taught at a distance between 2 and 10 times, while 9.1% had taught at a distance once. Almost eighty percent (79.5%) of the faculty members responding to the survey indicated that they had never taught a class to learners at a distance.

Part II: Competence, Value, Quality of Infrastructure

Competence. Eleven items on the questionnaire were used to measure the perceived level of competence that respondents possessed in the use of electronic technologies often associated with distance education.

The faculty indicated that they were able to use many of these technologies. Almost two-thirds (62.7%) of the faculty indicated they agreed or strongly agreed that they could create their own presentation graphics, while less than a quarter (22.7%) disagreed or strongly disagreed. A clear majority of the faculty members (84.2%) agreed or strongly agreed that they used e-mail for "almost all of my correspondence," while 29.2% agreed or strongly agreed that they would send their "most important or confidential" documents through e-mail." A majority of the faculty members (58.7%) agreed or strongly agreed that they could "scan photographs into digital files," while 28.6% disagreed or strongly disagreed. Nearly one-half (48.1%) agree or strongly agree that they are able to "connect a computer to the various output devices available (LCD projector, TV, etc.)." By a narrow margin, the faculty members agree that they could "manipulate digital images" (45.6% agree or strongly agree vs. 42.9% disagree or strongly disagree). Slightly over one-half (54.6%) agree or strongly agree that they could "confidently deliver my course over the videoconferencing equipment."

While many of the faculty members were fairly confident in their ability to use presentation software, e-mail, and digital images in their teaching, they also identified areas in which they were not as confident. Over one-half of the faculty members (56.2%) disagreed or strongly disagreed that they could create their own web page. Only a handful would agree (6.6%) or strongly agree (3.1%) with the statement, "I am able to record and use digital sound in my presentations." Nearly two-thirds (62.7%) disagreed or strongly disagreed with the statement, I could confidently deliver my course on the web."

Faculty members had much more confidence in their technical competence than they did in their methodological ability to use these technologies in their teaching. Over one-half (55.6%) of the respondents disagreed or strongly disagreed with the statement, "I am familiar with the teaching methods appropriate for distance learning."

Importance. Nine items were used to measure value--that is--the importance of the role respondents believed these technologies have or will have to teaching agriculture.

An overwhelming majority of the faculty members strongly agreed (55.1%) and agreed (37.6%) with the statement, "The Internet/WWW are convenient ways to access information." Nearly half agreed or strongly agreed (48.3%) with the statement, "Participation in listservs, threaded discussion groups, chats and other electronic communications offers great benefits." The respondents agreed (39.7%) and strongly agreed (18.3%) that most course materials could be improved by incorporating multimedia. They agreed (40.3%) and strongly agreed (17.5%) that, "Animated graphics increase student interest and retention." Almost exactly two-thirds (66.1%) of the respondents agreed or strongly agreed that, "Students today prefer a more visual learning experience." Over three-quarters of those responding (80.3%) agreed or strongly agreed that, "Electronic information technologies provide students with instantly available supplemental course and research materials." Over one-half (60.8%) agreed or strongly agreed that, "It is important that I incorporate electronic information technologies in the courses I teach."

Faculty opinions were mixed concerning the effect of these technologies. While they clearly agree (38.0%) or strongly agree (31.9%) with the statement, "Electronic communications and information drastically alter how we teach in the next five years," they do not support the statement, "Electronic communications and information drastically alter what we teach in the next five years" (46.0% disagree or strongly disagree).

Quality of Infrastructure. Ten items were used to measure the perceived availability of equipment, facilities, and training to determine the extent to which the campus environment supported the use of technologically mediated instruction on- and off-campus.

Concerning the availability of equipment, 91.6% of the teaching faculty members indicated they were connected to electronic mail in their office and 71.9% indicated they were connected at home. More than one-third (42.2%) agreed or strongly agreed that, "The equipment needed to produce and display multimedia course materials is readily available to me." More than one-half (54.0%) agreed or strongly agreed that they were aware of "the necessary procedure to secure electronic presentation equipment for classroom use within the university." Over half of the faculty members (52.2%) agreed or strongly agreed that that they "have access to a classroom designed to support the use of multimedia teaching aids."

Teaching faculty members perceived training and assistance in the use of instructional technologies to be less available than equipment. More than one-third (38.4%) disagreed or strongly disagreed that "there are ample opportunities to secure faculty development on using multimedia and videoconferencing equipment" while 26.6% agreed or strongly agreed. While 44.3% indicated they were neutral on the question, 10.7% strongly disagreed with the statement, "There are enough faculty development workshops regarding videoconferencing" while 6.9% strongly agreed. Over half the faculty members (57.4%) disagreed or strongly disagreed that they were "Aware of the procedure, office, and personnel responsible for scheduling videoconference classes/sessions for the college."

The respondents did not believe that the climate was supportive of the use of these technologies. Almost one-half of the respondents (42.7%) disagreed or strongly disagreed that, "The time spent developing course materials is valued by my department."

It was interesting to the researchers that the faculty members who had not participated in distance education perceived the level of support as lower than those who had taught classes at a distance. When all 263 faculty were included, only 29.5% agreed or strongly agreed that they "Had access to technical assistance when teaching at a distance." Of the 54 faculty members who had taught at a distance, 51.9% agreed or strongly agreed with the statement, while 27.7% disagreed or strongly disagreed.

There were three open-ended questions on the survey: 1) What would significantly improve your use of the electronic technologies often associated with distance education? 2) What components should be present in an effective course delivered using electronic technologies? 3) Please provide any other comments and/or suggestions you believe are relevant to teaching and learning with technology.

For the first open-ended question, "What would significantly improve your use of the electronic technologies often associated with distance education?" respondent themes were compiled into six categories: 1) *Support Resources* (technical and course conversion personnel, including funding student workers/graduate students, 2*) Faculty Rewards/Recognition* (release time/faculty development to learn to use technologies, recognition for tenure & promotion, etc., 3) *Training* (to improve comfort and familiarity with equipment), 4) *Access to State-of-the-Art*

Equipment, 5) *Quality Assurance* (through research, success at other peer institutions, and continuity in format and procedures), and 6) *Availability of an Audience Base*, (to sustain and make the effort worthwhile).

Supporting quotes ranged from philosophical components about quality assurance to the lack of any rewards to participate. One lengthy quote incorporated several dimensions. "I must be convinced that distance education does not create an inferior product. I am very concerned that the teaching style necessary for electronic delivery would compromise the learning experience for off-site as well as on-site students. It seems that the present climate emphasizes accessibility over excellence. In addition to these philosophical questions, there is of course the major issue of appropriately equipped classrooms and other facilities." Another goes on to note, "seeing solid evidence that peer institutions are successfully adopting similar approaches and are maintaining the academic reputations" indicated that teaching faculty want to "watch and wait" to see if distance education technology will "stand the test of time." Many faculty members perceived a lack of "Real SUPPORT from the department and university, including recognition that its development in my program is as important and valued as developments in my research. This recognition would need to be accompanied by time for necessary TRAINING and the ready access to equipment (respondent emphasis)." Additional time was most frequently mentioned as a factor to improve use. "Having enough time to develop the materials needed, and to practice developing and using the materials. One-shot training programs....leave me frustrated...." Others mentioned the need for an audience base to justify the additional time and effort: "An audience that expresses a need and is willing to provide financial resources to justify allocation of faculty time to course and materials development." Overall, there is a perception that these six areas must be addressed prior to faculty adoption of distance education technologies.

In describing faculty perception of teaching and learning at a distance, as well as their level of competence and confidence, a second open-ended question was used: "What components should be present in an effective course delivered using electronic technologies?" There were five primary categories: 1) *Interactions/Feedback*, 2) *Systematic Instructional Design*, 3) *Multimedia Components*, 4) *Simple and Reliable Delivery System* (that is supported and easily accessible), and 5) *Strong Content/Supplemental Materials*. Faculty again mentioned the importance of time and money to create and fully utilize computer technology. There was a strong view that the components of effective instruction for distance learning are the same as "traditional" courses. "The same components are needed for effective course delivery in any learning/teaching environments: Good preparation, thoughtful planning, updated materials, enthusiasm, and empathy for the students." Many mentioned fundamental components like "purpose of exercise, objectives, clear and visible materials, critical messages, interaction, feedback, testing, integrity, high quality graphics." Most emphasized the importance of interaction (mentioned 60 times). "The professor must be able to 'connect' with each and every student during the lecture and students must have unhindered access to the professor." Others noted the importance of suitable technology. "We need a simpler delivery system that also gives quality projection for the site audience here."

The last open-ended response allowed faculty to provide any additional comments and/or suggestions relevant to teaching and learning with technology. Many of the same themes were reiterated. "Technology is a tool similar to a chalkboard or overhead---all tools have advantages and disadvantages over all other tools available. There is no 'perfect' teaching philosophy or tool, only varying degrees of effectiveness with various audiences." "If we are to expect our students to be technologically savvy, we (the instructor) should role-model this for them…The primary hurdle…is access (and maintenance) of equipment." "If distance teaching is to be employed on a large scale, something must be done to make up for the disconnect between teachers and students, and the loss of the 'collegiate environment' or the 'other education.'" "Development of high quality courses for distance education requires significant investments of time and resources which our program is not well-equipped to accommodate at present."

Conclusions and Recommendations

The average teaching faculty member was a male, between 51-65 years of age, with more than 15 years of teaching experience, tenured at the rank of professor, and who has never taught students at a distance. This population is significantly different than those described in Dillon and Walsh's (1992) metaanalysis of distance education research that focused on faculty members who had previously taught one or more distance courses. The faculty members in this study were employed at a land grant institution and perceived a lack of institutional support for teaching in general, specifically the time and support necessary for the innovative application and development of educational technologies.

In general, the teaching faculty agreed that these technologies can make a valuable contribution to the learning process, that they should be used in all classes, those taught on- and off-campus, and that they will change how we teach in the next five years.

The majority of faculty reported having a website, primarily for course enhancement. They administered that site themselves on departmental servers. Twice as many faculty members maintained their own webpages as those who employ graduate students or support staff for that purpose. It would seem that even in the face of multiple demands on their time, many faculty members choose to use their time in support of course websites, although few actually have experience teaching a course at a distance.

As an indication of competence, the respondents indicated that they were able to use many of these digital teaching technologies. A notable exception was their lack of ability to use digital audio. Digital audio can often contribute as much or more than digital images to an instructional delivery strategy, and digital audio can be a less demanding media type—to create, edit, and use—than digital photography. Many of the most modern digital communications technologies, Internet videoconferencing (H.323), and Streaming Media require—or at least benefit from—the use of properly created digital audio files. Yet, the faculty members were much more confident in their ability to create, edit, and use digital images. We therefore recommend that the basic creation and use of digital audio files be included among the faculty development opportunities made available.

Faculty members had more confidence in their technical than their methodological ability to use these technologies in their teaching. A majority of the respondents indicated that they did not understand how to incorporate these technologies into their teaching. We therefore recommend that specific methods of using these technologies to enhance and extend teaching be included in each of the technical faculty development opportunities.

The agricultural teaching faculty members valued these technologies and recognized in general that they are—and will be—an important part of the instructional process. They supported the notion that these technologies will change the way teaching and learning occurs within the next five years. They alluded to the ways in which the process might be altered through their support for items that describe learners as more central to the instructional design process. The faculty members perceive that students today prefer a more visual learning environment, and that the Internet can provide instantly available supplemental course and research materials. Over 90% of the faculty perceived the Internet as a convenient way to access information, and over half believed that the use of rich media (multimedia, animations) enhanced instruction. Over 60% of the faculty believed that, "It is important that I incorporate electronic information technologies in the courses I teach." Still, slightly over one-half did not have a course website of any kind. The apparent discrepancy between espoused and actual commitment to the use of these technologies was interesting and worthy of additional research. It is therefore recommended that additional research be conducted to identify the barriers to adoption as perceived by both adopters and non-adopters.

Infrastructure was perceived as multifaceted and in general lacking in this institution. The teaching faculty members perceived that support and training were less available than equipment. During the past five years the college has devoted significant resources to enhancing faculty members' access to equipment. The availability, or lack thereof, of technical support personnel, has been left to departments. The researchers recognize that budgeting is a complex task, and that 'one-time' expenditures for equipment are often easier than on-going salary lines for technical support personnel. We recommend, however, that resources be directed to create an adequate level of support and training such that these expensive pieces of equipment are used for the benefit of students.

All 262 respondents were generally neutral regarding the statement, "Faculty have access to technical assistance when teaching at a distance." Those 54 respondents who had offered courses via distance education in the past responded more positively to the statement. The researchers concluded that support for the use of these technologies was actually more available than was generally perceived. We therefore recommend that the unit tasked to provide support services and faculty development communicate their role more effectively throughout the college.

According to Olcott and Wright (1995),

> "The accelerated development of distance education programs across American higher education will require a renewed commitment to its most important resource . . .faculty. Advances in technology afford institutions unique opportunities to deliver education.... However, responsibility for instructional quality and control, the improvement of learning, and the aggregate effectiveness of distance education still rests with the faculty."

This study identified the faculty members' perceived competence, value, and quality of the infrastructure available to facilitate instructional use of digital technologies. It is indeed true that faculty roles and responsibilities must change to accommodate the use of these technologies, and that teaching at a distance does require a different set of competencies. Yet faculty members' attitudes, and the barriers created by the lack of institutional support, must be addressed to integrate more fully these technologies into the teaching and learning process.

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College of Agriculture Faculty Perceptions Of Electronic Technologies in Teaching

A Critique

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The researchers have attempted to create "baseline data" regarding the use of digital technologies in teaching. They acknowledge in the literature review that similar studies have been conducted for more than ten years, but make the case that an important factor has been ignored – the faculty. Faculty competence, faculty perceptions of value, and infrastructure are the key components for examination in this study.

A census of the population was studied. For the most part, appropriate methodology was used. The instrument was designed by the researchers, which is expected when the stated purpose indicates a new area on inquiry. The one methodological flaw is in the use of early and late respondent comparisons for addressing non-response error. The researchers were able to identify and contact every member of the population. Mail, e-mail and telephone contacts were made to encourage response. A more appropriate method of assessing non-response error would have been to contact a representative sample of non-respondents, have them respond to a carefully selected set of questions, and then determine whether they differed from respondents on key characteristics and responses. At least one study has shown that the result of comparing early and late responses is highly dependent upon the definition of "early" and "late." That technique should be used when other means of control are not feasible. Such was not the case in this study.

The recommendations are based on well-written findings and conclusions. Essentially, there are two recommendations. First, provisions should be made in faculty development programs for faculty to acquire the skills needed to incorporate digital technology into their courses. Secondly, the infrastructure is probably present, but it may be a well-kept secret. So what can be done to address these major concerns?

The vocational roots of many people in agricultural education may be of value here. Vocational instruction is built on felt need, real-life situations, and problem solving. Faculty will learn and use new technology only when they have a need. Faculty will learn more when the use of digital technology helps solve a real-life problem for them. How can agricultural education play a leadership role in helping faculty identify the need and identify ways that the technology will help them teach and help their students learn? In vocational education, we teach basic skill development prior to requiring students to use those skills to solve problems. How can agricultural education help bridge the gap between the availability of equipment and faculty learning to use and apply the skills that the equipment will allow?

Cognitive and Affective Outcomes of Animation On Asynchronous Learning of Agricultural Science Concepts

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Abstract

This exploratory study examined the use of animation as a learning tool for complex, life science content in a College of Agriculture and Life Sciences upper-division course. Sixty-three students were given CD-ROMs with six animations created in Macromedia Director® and completed on-line quizzes classified by conceptual learning goal emphasis (CLGE) from simple to complex. Percentages of correct, partially correct, and incorrect answers were calculated for each content-specific question. The typological analysis of questions on each quiz revealed a distribution of conceptual learning goal emphasis (CLGE) across all levels, with exactly one half of the questions at the upper tier of cognitive complexity. A comparison of responses across all quizzes indicated similar patterns, with 75-87% of students correctly answering questions, regardless of the level of cognitive complexity. Viewing the animations differentially benefited students with lower GPAs in terms of their overall course grade, whereas students with higher GPAs performed just as well with or without viewing the animations. Consequently, the researchers believe that students with lower GPAs may have misconceptions (perhaps due to learning the phenomena incorrectly in the past), lack of prior knowledge to scaffold to higher order (more complex) content, or lack of abilities to abstract and/or visualize complex, systemic processes. Students found the animations helpful and easy to use, and provided suggestions for improvement in content clarity and overall animation design. Convenience, flexibility, and self-directness were perceived affective outcomes of asynchronous learning through analysis of the open-ended responses. The current job market is seeking the society-ready graduate who not only has skills in problem solving, communication, and technology, but the independence and self-directedness to be a life-long learner. This study supports animation as an asynchronous learning tool to improve cognitive understanding, student performance, and student self-efficacy for continued learning throughout a lifetime.

Introduction

Awareness is escalating that our educational systems are facing inordinate difficulties in trying to meet the needs in our changing and increasingly technological society. One difficulty in higher education is teaching in large lecture halls using the chalkboard or overhead projector and assessing "learning" through multiple-choice exams. This approach makes it difficult to challenge the learner at higher cognitive levels. Students often have difficulty "tying together" the pieces of content into an understandable "whole." "[V]erbal, written, and static-diagram explanations of complex processes are woefully inadequate. Using static description, students seem unable to grasp a full understanding of the intricacies of communication between cells, for instance, or of protein-protein interactions" (Nicholls, Merkel & Cordts, 1996, p. 359).

Theoretical Framework: Cognitive Complexity of Conceptual Learning

Researchers have been studying the effects of animation on concept learning for many years (ChanLin & Chan, 1996; Hall, 1996; Holliday & McGuire, 1992; Rieber, 1991; Williamson & Abraham, 1995). We know that animation can increase learner interest and motivation, provide metacognitive scaffolding and "mental models," and promote visual stimuli to establish connections between the abstract and the concrete. "Historically, media have been described in terms of their surface features—television, print, audio, and graphics. However, describing surface features alone does not help explain how media interact with the cognitive and social processes associated with learning" (Smith & Dillon, 1999, p. 12).

Classification of conceptual learning goals in this study followed the guidelines established by Stuessy and others (Stuessy & Payne, 1993; Stuessy, Alexander, Knight, Kulm, & Tucker, 1995; Stuessy & Thomas, 1998) in their organization of scientific knowledge by conceptual themes. As opposed to theories, which unify and make sense of facts and hypotheses related to a particular natural phenomenon, themes are pedagogical tools that cut across disciplines. Conceptual themes can be used effectively to provide a pedagogical "hook" to link new information to students' prior knowledge. These hooks also can be used by instructors to link the theoretical structures of more than one discipline and to show how they are logically parallel and cohesive. Ultimately, an analysis of conceptual learning goal emphasis (CLGE) by conceptual theme could provide an instructor with a method for assessing and balancing the learning requirements of a particular lesson, instructional unit, or course.

For the exploratory purposes of this study, conceptual themes were used as a venue for evaluating the complexity of questions posed in an Agriculture and Life Science course at a major Research 1 University. Five conceptual themes frequently appearing in the literature and based upon CLGE were used: *Structure, Interaction, Change, Energy*, and *System*. Conceptual understanding of each of these themes is necessary in order for students to construct a holistic understanding of the phenomenon under study: *What is this structure? What does it do? With what does it interact? What are the changes that occur? How do the changes occur? How does this structure interact with other structures?*

The five conceptual themes were concept mapped, analyzed, and scored according to their super- and subordinate concepts and propositions according to strategies first established by Novak and Gowin (1985). On the basis of the scores for each of the concept maps, the conceptual themes were organized hierarchically (with 1 being lowest in terms of numbers of concepts and propositions, and therefore simplest, and 5 being highest in terms of cognitive complexity). Five nominal categories resulted in this order: *Structure* (1), *Interaction* (2), *Change* (3), *Energy* (4), and *System* (5).

Background, Purpose, and Research Questions of the Study

A College of Agriculture and Life Sciences professor was concerned about the lack of student comprehension of biochemistry concepts in her courses. She believed that the use of visualization with color and motion would improve understanding. The instructor's intent was to integrate prior knowledge with new knowledge in order to facilitate understanding of dynamic concepts and to "tie together" inert, static, factual information with more complex cognitive processes. Based upon these assumptions, six animations were created in spring 1999 using Macromedia Director® by a curriculum specialist working closely with the instructor.

The purpose of this study was to explore the use of animation as an asynchronous learning tool in an upper division undergraduate course (NUTR 470: Nutrition and Physiological Chemistry). As suggested in the literature, would animations help students make connections and "paint a vivid picture of what components are involved, how they interact, and why they are important, giving students a better understanding of what is happening between and within living cells over time and space" (Nicholls, et al., 1996, p. 359)?

To determine if this statement and our assumptions were true, four research questions were posed: 1) For students who viewed the animations, were there patterns or consistencies in cognitive complexity of conceptual learning? 2) Did animation as an asynchronous learning tool provide an advantage in academic success in the course under investigation? 3) Were there clusters and/or patterns in students' responses to questions about animation design? 4) What were the non-academic (affective) outcomes of asynchronous learning?

Methods and Procedures

Six animations were distributed via CD-ROM to all 63 undergraduate students enrolled in the course. The first animation (gene expression) served as a pilot test to ensure that our procedures were working correctly. For the remaining five animations, students completed a voluntary on-line questionnaire that was returned via e-mail for extra credit points. The on-line questionnaire included content-specific questions to determine knowledge acquisition and conceptual understanding as well as questions about the effectiveness of the animation as a delivery technique.

Questions on each of the animation quizzes were then subjected to a typological analysis using methodologies established by Goetz and LeCompte (1984). Conceptual thematic emphasis categories of *Structure, Function, Interaction, Change, Energy*, and *System* were used as the predetermined typologies in the analysis. The analysis resulted in the classification of each quiz question as to its primary emphasis and therefore its cognitive complexity.

Inter-rater reliability among the authors was achieved through a process of individual ranking and reconciliation of differences by consensus. Student responses on the quizzes were "graded" by the course instructor to determine percentages of correct, partially correct, and incorrect answers. Students also completed an on-line summative evaluation form that was returned via e-mail to the departmental advisor rather than to the professor. Additionally, the course instructor was interviewed to provide the learning context and perceptions of the effectiveness of animation as an asynchronous learning tool (See Table 1).

Table 1

Methods and Data Sources for each Research Question

Data Source	Time of Admin.	n	Research Q 1	Research Q 2	Research Q 3	Research Q 4
On-line feedback (ETS)	June 2-7, 1999	47	✓		✓	
On-line feedback (Glucagon)	June 7-10, 1999	52	✓		✓	
On-line feedback (Steroid)	June 16-21, 1999	54	✓		✓	
On-line feedback (Cholesterol)	June 16-21, 1999	54	✓		✓	
On-line feedback (Vitamin D)	June 24-28, 1999	31	✓		✓	
On-line summative evaluation	June 30-July 12, 1999	10				✓
GPA/Course Final Grade	August, 1999	61		✓		
Instructor Interview	December 6, 1999	1	✓			✓

The researchers used the constant-comparative method to 1) compare incidents applicable to each category, and 2) to integrate categories on all open-ended responses (Lincoln & Guba, 1985; Glaser & Strauss, 1967). The data collection procedures were not confidential, but all responses were coded to ensure student confidentiality for reporting of results. Quantitative data were analyzed using SPSS software version 9.0 for Windows. Descriptive statistics and multiple regressions were performed to assess the effects of Grade Point Average (GPA) and numbers of animations viewed by students on students' final course grade.

Results and Findings

Research Question One

For each animation, students answered a series of questions that were classified by cognitive complexity. Percentages of correct, partially correct, and incorrect answers were calculated for each content-specific question. The typological analysis of questions on each quiz revealed a distribution of conceptual learning goal emphasis (CLGE) across all levels, with exactly one half of the questions at the upper tier of cognitive complexity (Structure/Function and Interaction questions = 16 and Change, Energy and System questions = 16). In an upper division undergraduate course, one would expect student conceptual understanding to peak in the lower cognitive domain (prior knowledge) and diminish, as material becomes more novel and complex. A comparison of correct, partially correct, and incorrect responses across all quizzes indicated similar patterns, with 75-87% of students correctly answering questions, regardless of the level of cognitive complexity (See Figure 1). These findings were remarkable to the course instructor: "I couldn't believe that so many of my students understood the complexity of the electron transport system, which I had not found in other classes. It was surprising to me that after viewing the animation, most of my students could integrate gene expression (genetics courses) with regulation of metabolic pathways in the cell (biochemistry courses)" (I1). The instructor was assuming that the origin of the lower level questions was from prior classes and was surprised that student responses were the same at lower levels as higher levels of cognitive complexity. "There's no difference even when the questions become more complex. The only place students can get this is from the animations" (I1).

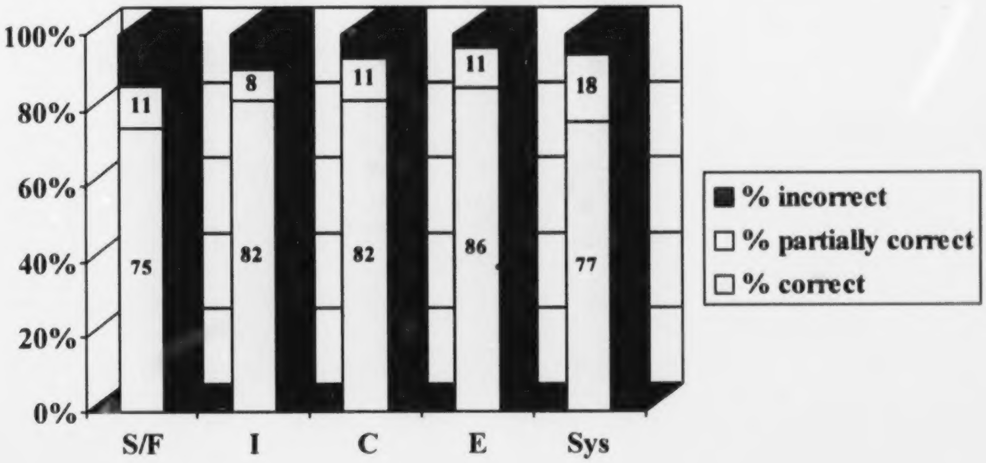

Figure 1. Percentages of student answers that were correct, partially correct, and incorrect from lowest to highest cognitive complexity. *Note.* Of the 32 questions, 16 were lower cognitive complexity (Structure/Function and Interaction) and 16 were higher complexity (Change, Energy, and System).

Research Question Two

The instructor's experience over a number of years in working with students in this particular course led her to suspect that those students in the course with lower GPAs would be the group to benefit most from the addition of animations to the repertoire of study aids for the course. In order to test the instructor's suspicions, multiple regressions were performed to assess the effects of Grade Point Average (GPA) and number of animations viewed on students' final course grade. Students' final course grades of A to F were translated to numerical scores of 4, 3, 2, 1, and 0, with 4 representing an "A." To test the overall effects of number of animations viewed and GPA on final course grade, as well as differential effects of animations and GPA on students subgrouped by higher (GPA > 3.0, n = 29) and lower (GPA < 3.0, n = 33) GPAs, three multiple regressions were performed. Descriptive statistics are provided for all students and for the two subgroups of students in Table 2.

Table 2

Descriptive Statistics for All Students and Students Grouped by GPA

	N	Mean	Std. Deviation
Grade in course for all students	61	2.92	1.16
GPA for all students	61	2.95	0.50
# animations viewed by all	61	3.74	1.52
Grade in course for students with GPA < 3.0	32	2.22	1.07
GPA for students with GPA < 3.0	32	2.55	0.24
# animations viewed for students with GPA < 3.0	32	3.41	1.56
Grade in course for students with GPA > 3.0	29	3.69	0.66
GPA for students with GPA > 3.0	29	3.40	0.27
# animations viewed for students with GPA > 3.0	29	4.10	1.40

In the regression performed to assess the effects of GPA and number of animations viewed on all students' performance in the course, both GPA and number of animations viewed were significant ($p < 0.05$) predictors. Standardized Beta coefficients indicated that GPA was a stronger predictor (B = 0.615) than number of animations viewed (B = 0.374) (See Table 3).

Table 3

Multiple Regression to Determine the Effects of GPA and # of Animations on the Final Course Grade of All Students (n = 61)

Model	Standardized Coefficient (Beta)	t	Significance
1 (Constant)		-4.120	.000
GPA	0.615	7.412	.000*
# of Animations	0.374	4.502	.000*

p < .05

In the multiple regression performed to assess the effects of GPA and number of animations viewed on the subgroup of students with GPAs above 3.0 (n = 29), GPA was the only significant ($p < 0.05$) predictor. Number of animations viewed had no effects on the final course grade of students with the higher GPAs (See Table 4).

Table 4

Multiple Regression to Determine the Effects of GPA and # of Animations on the Final Course Grade of Students with GPAs above 3.0 (n = 29)

Model	Standardized Coefficient (Beta)	t	Significance
1 (Constant)		-0.297	.769
GPA	0.429	2.505	.019*
# of Animations	0.325	1.899	.069

p < .05

In the regression performed to assess the effects of GPA and number of animations viewed on the subgroup of students with GPAs below 3.0 (n = 32), number of animations was the only significant ($p < 0.05$) predictor. GPA was not a significant predictor of final course grade for students in the lower GPA category (See Table 5).

Table 5

Multiple Regression to Determine the Effects of GPA and # of Animations on the Final Course Grade of Students with GPAs below 3.0 (n = 32)

Model	Standardized Coefficient (Beta)	t	Significance
1 (Constant)		-1.468	.153
GPA	0.289	2.038	.051
# of Animations	0.542	3.820	.001*

p < .05

Results of the multiple regression analyses confirmed the instructor's suspicions. For all students in the course, both GPA and number of animations viewed were significant predictors of final course grade. When students were divided into subgroups, however, the values of these two variables in predicting final course grade, as determined by comparing standardized Beta weights in the two regressions, were reversed, with one of the predictors in both subgroups dropping out as non-predictive of final course grade. For students in the higher GPA subgroup, GPA was the only significant predictor; and for students in the lower GPA subgroup, number of animations viewed was the only significant predictor. These results support the instructor's original "hunch" that the animations were beneficial to the conceptual understanding of students in the lower GPA category and that students with higher GPAs did not need the animations in order to perform well in the course.

Research Question Three

By using the on-line feedback data from each animation, the researchers analyzed and coded all open-ended responses. Each animation was coded with one to three letters corresponding to the animation under study (ETS=Electron Transport System, G=Glucagon, C=Cholesterol, S=Steroid, and VD=Vitamin D) and a number based upon receipt of the on-line feedback. There were three "clusters" of responses to: 1) Were the animations helpful? 2) Were the animations easy to use? and 3) How could they be improved? For the first animation, almost every respondent noted that it was helpful, especially in visualizing the process. "The animations were helpful because it is much easier to learn this material if it can be visualized" (ETS6). "I really found the animations useful because I think of myself as a very visual learner. It is often difficult for me to grasp a lot of these types of concepts by simply 'picturing' them in my head" (ETS30). "It brought the process to life, and this aides in my ability to understand and REMEMBER the concept" (ETS12-student emphasis). Students also commented that they liked being able to pause the animation (ETS1, ETS23) and felt the overview at the beginning helped to set the stage for what they would be seeing (ETS6).

On ease of use, all respondents, except one, commented that they had no problems with the use of the animation. ETS44 had a problem with finding a computer that would read the CD-ROM, but another student commented that they were glad they didn't have to install any new programs on their computer to use the animation (ETS36).

Within the improvements category, answers tended to fall in two areas: content and design. In the content area, students wanted more detail and explanation in order to answer the questions solely on the animation, rather than referring to course notes (ETS6, ETS10, ETS17, ETS18, ETS20, ETS28, ETS41, ETS43, ETS45, ETS26, ETS35, ETS19, ETS20, ETS39, ETS22). In the area of animation design, students felt it was difficult to read text while watching the animation. Several suggested adding audio/narration (ETS3, ETS46, ETS5, ETS16, ETS41, ETS13). The other design feature mentioned was the capability of rewinding or fast-forwarding without having to replay the whole animation (ETS7, ETS11, ETS15, ETS21, ETS25, ETS33). This trend is true throughout all the animations so for the remainder of this section, only new findings will be mentioned.

By the second animation, students began to comment on the usefulness of the animation and questions in helping to learn and remember the concepts (a review mechanism) (G2, G29, G32, G46, G48, G49). "I love these animations!! They truly make learning these processes much easier. Seeing it on paper just isn't enough. It is great to watch and see how it actually works" (G5). As they watched the animations, they would review their notes and use this as a form of "self-study." "They tie the lecture notes together well, which helps people like me who need visual aids to understand biochem better" (G11). "…Not only do you have your notes but also the animations to show more clearly how the pathways or mechanisms actually work" (G26). Some students did mention that the information was already covered in class/notes so it was hard to tell if the animations helped (G22, G43). They found this duplication redundant. Another emerging theme for this animation was that *simplicity is clarifying* (G36, G39, G40). This supports the work of other researchers about the use of animation for clarifying complex, abstract content (ChanLin & Chan, 1996; Smith & Dillon, 1999).

The third animation was not considered as helpful as the other animations and many found it confusing (C4, C6, C8, C9, C12, C36, C50, C51, C15, C29, C22, C28, C32, C41). They also found this animation too similar to other animations (C8, C41, C9). Many changes are needed in content for this particular animation, although the design issues remained the same (a way to control the viewing options and inclusion of audio). For the fourth animation, most found it to be more helpful than the third, although some still found it confusing (S4, S7, S12, S32). Both of these animations had overwhelming comments about incongruence between the animation and the questions asked (C1, C4, C6, C9, C10, C14, C15, C20, C23, C24, C26, C28, C30, C31, C32, C33, C39, C41, C45, S5, S7, S10, S12, S22, S41, S44).

For the final animation, students were beginning to reflect on the impact that the animations made in the overall conceptual understanding. "All of these animations have been VERY helpful in understanding the full concept of how these processes work. For the first time, in any chemistry based course, I am actually learning and UNDERSTANDING everything" (VD3-student emphasis). "The animations help paint a memorable picture in my mind of how vitamin D works" (VD21). One student commented that they watched this one three times and that repeated viewings were helpful (VD4). Others commented that the process "makes us study the material ahead of time" (VD12) and that "it actually helped me on a test for a different class" (VD17).

Research Question Four

In addition to the animations on CD-ROM, all students had access to asynchronous course materials through a website (http://acs.tamu.edu/~jmm2526/index.html) and had the option of taking the course over the Web. Based upon the summative on-line course evaluation and instructor interview, there were three non-academic outcomes of asynchronous learning: 1) convenience, 2) flexibility, and 3) self-directedness. Two students living and working in Houston and one convalescing from a serious illness in Dallas were able to complete the course, without driving to campus except for exams (I1, E3). Even students on-campus appreciated the convenience, especially if they had a computer at home, as there was no time wasted driving, parking, etc. (E2, E10). It was much easier for students to get the notes and problem sets off the web. "Missing class doesn't hurt you as long as you go over everything on your own" (E10). Students also appreciated the flexibility and freedom of asynchronous learning. "This was the first web-based course that I have taken and I really enjoyed the freedom it gave me in my academics" (E1). They liked being able to view things on their own time (E6, E8, E9, E10). "Sitting through a lecture nowadays is almost a waste of time" (E4). But even with the convenience and flexibility that on-line learning offers, the most profound implication is the realization that they can be self-directed learners. "I am planning on attending physical therapy school and I know that some use [distance learning]. This was a good experience for me because now I know I can learn in such a situation" (E7). These students became more self-directed and motivated because *they* were in control of the learning environment. The instructor corroborates these findings.

Conclusions, Implications, and Recommendations

Animation can be a powerful tool to demonstrate agricultural science principles. Both micro and macro processes can be more easily visualized using these learning tools. Seeing movement and color helps to bridge the gap that learners often develop during the fragmented instruction of difficult concepts and helps the instructor explain dynamic concepts (Mouzes & Magill, 1995).

For students who viewed the animations, the percentage of correct responses on quizzes remained consistent, even with increased cognitive complexity in the questions being asked. An implication exists that animation may provide the necessary conceptual framework to help learners visualize systematic processes. The findings of the statistical procedures of multiple regression also support this implication. Viewing the animations differentially benefited students with lower GPAs in terms of their overall course grade, whereas students with higher GPAs performed just as well with or without viewing the animations. Consequently, the researchers believe that students with lower GPAs may have misconceptions (perhaps due to learning the phenomena incorrectly in the past), lack of prior knowledge to scaffold to higher order (more complex) content, or lack of abilities to abstract and/or visualize complex, systemic processes. These results strongly suggest that instructors should encourage their students with lower GPAs to take advantage of animations in their learning of biochemistry concepts in their agricultural science courses. Further research is planned before stronger recommendations can be made regarding the use of animations with this particular subgroup of students.

For this course, students found the animations helpful and easy to use. Based upon the standard course evaluation forms and summative on-line evaluation, the students loved the course and felt that the animations improved their conceptual understanding. Beyond convenience and flexibility for the learner, the non-academic outcome of "self-directedness" can be considered an attribute of asynchronous learning. One implication of using asynchronous technologies for "on-campus" courses may be to provide the confidence and skills to prepare undergraduates as "society-ready" and life-long learners.

Because this was an exploratory study, the researchers plan to conduct follow-up studies (summer, 2000) to test our assumptions more fully. We would like to determine if asynchronous learners have different learning preferences (visual, auditory, read/write, kinesthetic—e.g., Are there patterns or consistencies in answers of students with different learning preferences?) Changes in the animation design have also been implemented, such as the ability to replay a portion rather than the whole animation. A pre-test (with comparable questions on the final exam) is being developed and modifications are being made to the animations' content and questions from the on-line feedback to improve clarity.

Finally, this study implements a new theoretical framework for the construct of cognitive complexity (CLGE) that has implications for use by agricultural educators. Traditionally, agricultural educators have used Bloom's taxonomy for characterizing the cognitive domains of learning. The CLGE provides a new way of analyzing conceptual understanding that is based upon the cognitive complexity of the scientific content. The CLGE classification applied specifically to agricultural science concepts could clarify complex understandings through instructors' explicit connections to students' prior knowledge about structures and their functions, interactions, change, energy, and systems. Instructors who model the application of the CLGE system of classification would integrate generic questions in their introductions of content, asking questions such as: *What is this structure? What does it do? What do we know about the function of these types of structures? With what does this structure interact? What are the changes that occur? How do the changes occur? How does this structure interact with* *other structures? What changes occur in this system as a result of this interaction?* Students who become adept in asking these types of questions when confronted with novel objects and events may acquire strategies that have implications for real-world application as they enter the world of work.

The current job market is seeking the society-ready graduate who not only has skills in problem solving, communication, and technology, but the independence and self-directedness to be a life-long learner. The study supports animation as an asynchronous learning tool that improves cognitive understanding, student performance, and student self-efficacy for continued learning throughout a lifetime.

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Acknowledgment: This study was funded through the Interdisciplinary Research Initiative Program at Texas A&M University.

Cognitive and Affective Outcomes of Animation On Asynchronous Learning of Agricultural Science Concepts

A Critique

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This study was highly focused – one instructor, one course, and one asynchronous learning tool. While the particular results may not be generalizable to a wide audience, the researchers do provide interesting insight into the broad field of asynchronous teaching and learning. The study is well-founded in conceptual learning and uses a new approach to thinking about cognitive processes.

The procedures used in the study are appropriate. Eight data sources were used to provide 14 data points for analysis. The findings are clear, notwithstanding an overload of detail in identifying particular responses to particular questions. Conclusions and recommendations flow from the findings, and the researchers are to be complimented for not overstating the value of their findings through sweeping recommendations and implications. The inclusion of quotes from the participants adds to the readability of the report; frequent references to the instructor's "hunches" in relation to findings adds interest but little else. Hopefully the study was based on the well-written theoretical framework rather than the instructor's pre-conceived suspicions.

This study provides one excellent example to address questions raised in the earlier papers of this session. "Animation can be a powerful tool to demonstrate agricultural science principles" says it all. For this course, this instructor and this group of students, the availability of asynchronous animations depicting complex processes helped to enhance learning. As the authors note, however, that finding may apply only to a subset of the students in the course. Nevertheless, the use of the asynchronous tool did not detract from learning for any other subset of the class. Just as in any other learning tool, the results vary among groups. The fact that the results may not be equal across various groups should not discourage the further use of that particular tool.

One recommendation of particular note addresses further research. While this is often a standard recommendation, in this case the suggestion is clearly warranted and the ideas presented are worthy of consideration. How can agricultural education provide leadership and guidance for replication of this study and for using this study as a basis for examining other asynchronous tools? What role can agricultural educators play in helping instructors incorporate asynchronous learning tools in other areas of science and including on-campus courses?

Steering Through Turbulent Waters While Developing A Community Of Practice: Struggles In An Undergraduate Leadership Course Based On Service Learning

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Abstract

Theories of leadership development have shifted from a focus on the individual during the past decades, to a new paradigm that focuses on group processes and motivation. However, critics argue that university level leadership education have not changed. The purpose of this study was to explore our own teaching practices and then share our insights with others who may struggle when developing communities of practice.

This study chronicles the first iteration of our joint teaching of an upper-level undergraduate agricultural leadership course. As the semester progressed, we found that learners participating in the community of practice struggled through interpersonal conflicts among themselves and with us. During the early stages of the service-learning project we felt this antagonism and distrust inhibited student learning and sought to understand what was taking place. We found Tuckman's (1965) theory of small-group development helped us "make sense" of what the students were experiencing. Tuckman (1965) concluded small groups go through predictable, sequential stages as they develop and carry out tasks. Awareness of these stages helped us to adjust our teaching pedagogy and steer learners through the process.

We steered through the most turbulent stages of the group development process by infusing pedagogical practices such as written and oral reflection and active learning groups. In this study we share learning interventions and facilitation practices that enhanced student learning. These were based on theorists who argue that learning is enhanced when people engage in group activities and communicate about issues that are important to them (Johnson, Johnson, & Smith, 1991; Lave & Wegner, 1991; Vygotsky, 1978). Understanding that communities of practice struggle through predictable developmental stages can aid teachers and learners as they make sense of interpersonal conflict on the road to forming successful groups. We found service-learning a viable context for leadership education and that it helps students apply theory to practice, while concomitantly motivating them to learn. Because undergraduate leadership education is challenged by a new paradigm, (a) service learning, (b) well-planned reflective practices, and (c) an understanding of Tuckman and Jensen's group developmental stages may help educators shepherd communities of practice to meet the ideals of this new paradigm.

Introduction

One of the greatest difficulties when teaching a technical laboratory course is to relate abstract theory to workplace situations (Olien & Harper, 1994). In addition to relating, part of the learning process includes helping students experience workplace roles and situations, including teamwork and leadership (Fritz & Foster, 1992; Olien & Harper, 1994). Theories of leadership development have shifted to a new paradigm that focuses on group process and motivation. Townsend and Throp (1997), however, argue that current leadership education at the university level has not shifted to meet this new paradigm. They state that working in - groups, developing an understanding of self, and gaining the ability to communicate are essential to developing leaders who are motivated and understand group processes.

To meet this new paradigm, Townsend and Throp (1997) and Bruck (1997) called for the teaching of leadership theory and the use of simulations to help students grasp the abstract concepts of leadership and teamwork. Along a similar vein, Conger (1992) suggested that to provide high quality and efficient leadership development programs in higher education, training should include four components: (1) personal assessment of skill competencies, (2) presentation and comprehension of concepts and theories, (3) skill -building simulations, and (4) feedback, or reflection on the previous three components. Critics argue that Conger's "ideal" scenario would fail in university settings because of: (a) a reliance on traditional didactic modes of instruction inhibit students from connecting course content to workplace problems (Conger, 1992), (b) the individualized nature of traditional classrooms pit students against one another and inhibit social interaction (Johnson, Johnson, & Smith, 1991), and (c) the decontextualized presentation of theory hinder students from developing accurate schema through reflection (Brookfield, 1995). In this paper, we argue that learning leadership theory void of a meaningful context limits the learner's ability to construct meaning. In other words, we agree with Conger's call for reflection, but disagree that simulations are the most fruitful means by which to situate learning.

With this in mind, we sought to teach a 300-level undergraduate leadership course through actively engaging students in problem-oriented situations where learners would put their existing knowledge about leading into practice. The goal was to use the situated-learning model (Greeno, 1989; Brown, Collins & Duguid, 1989) as the theoretical frame for the course. This model hinges on the theory that learning and cognition must take into account the social interaction and physical activity in which learners engage. One central component of this theory is the idea of a "community of practice." A community of practice provides for learning that is shared, purposeful, and patterned (Lave and Wenger, 1989). When engaged in a community of practice, learners work cooperatively on activities as they co-construct the meaning of their work. Consequentially, learning is enhanced as participation in communal experience increase. Learning, then, becomes a function of practice. In other words, learning is configured through the process of becoming a full participant in a sociocultural practice (Vygotsky, 1978).

Considering the notion that learning can be enhanced though shared purposeful activity, we designed an agricultural leadership course that required cooperation among learners and engaged them in activities that benefited others. We believed—as do Townsend, Bruck, and Conger--that teaching the new paradigm of leadership requires theory, personality self-assessment, and reflection, but also include another component—application - which requires instructors to situate learning in real-world contexts. In this case to bring a real-world context to learning, we chose to follow the service learning (SL) model.

Service learning can be defined as the "combination of the performance of a useful service for society and the disciplined interpretation of that experience for an increase in knowledge and an understanding of one's self" (O'Connell, 1990, p.594). Fritz and Brown (1998) pointed out that an experiential component of leadership education provides personal experiences those students can use to attune their conceptual understanding of leadership. Constructing personal understanding of principles also leads to higher cognition (Whittington and Newcomb, 1992). In addition, learners become engaged because SL leads to a "rekindling of students' interests" (Kunin, 1997, p.150). Whittington and Newcomb, (1992) suggested that if students' interests are reawakened, their interest can be sparked and their of cognition increased.

Context of the Study

This study chronicles the first iteration of our joint teaching of an upper level undergraduate Agricultural Leadership course. As the semester progressed, we found that as learners participated in their community of practice, they struggled through interpersonal conflict among themselves and between us. During the early stages of the service learning project, we felt this antagonism and distrust was preventing student learning and sought to understand what was taking place in these cooperative groups. We found Tuckman's (1965) theory of small group development helped us "make sense" of what the students were experiencing as they came together in a community of practice. Tuckman (1965) concluded that small groups go through predictable, sequential stages as they develop and carry out tasks. He labeled these developmental stages as (1) forming, (2) storming, (3) norming, and (4) performing. In subsequent years, Tuckman and Jensen (1977) added a fifth stage—adjourning - to the theory. To clarify Tuckman's theory, these stages, and their definitions, will be briefly discussed.

Tuckman suggested that the forming stage is defined by group behavior that hinges on individuals testing the boundaries of what is acceptable, this takes place on both an interpersonal level among members and the leader(s). In this stage, individual dependence on the leader or on some other powerful group member is high. In the second stage, inter-group conflict is the most notable characteristic. Members become hostile toward one another and toward the leader as they express their individuality and resistance to group formation. In the third stage, norming, the group overcomes resistance and moves onto cohesiveness "as new standards evolve and new roles are adopted" (Tuckman, 1965, p. 396). In addition, group members feel more comfortable with peers and express their personal opinions more readily. Performing characterizes the fourth stage. As group members become actively involved in completing or solving the task, individuals adapt to the interpersonal structure created by the group, roles become more functional, and group energy increases and focuses on meeting the goal. In the final stage—adjourning - members become aware of the demise of the group and experience feelings of sadness and remorse.

The theory of group development is well accepted in psychological circles and has been adopted by the educators in leadership development. These stages hold promise for explaining to teacher-practitioners the probable struggles that may occur as they develop communities of practice within their classrooms. The remainder of this paper describes and interprets the stages the leadership course students entered and exited as they formed a community of practice.

Purpose and Objectives

The purpose of this qualitative study was help leadership educators prepare themselves for the struggles of developing communities of practice. The objectives were:

(1) To describe how involvement in a service learning project influenced the development of a community of practice.
(2) To document pedagogical practices that the teacher/researcher used to promote the development of a community of practice.

(3) To evaluate the effectiveness of reflective practices in helping students' link the service learning project to leadership theory.

To make sense of how this specific community of practice formed, Tuckman and Jensen's model serves as a frame. The methods used to document the stages of group development are explained in further detail in the methods section.

Methods

This study employed classroom ethnographic techniques. Hammersley (1990) suggested that the goal of classroom ethnography is to bring forth "patterns of intention and motivation which produced it" (p. 100). To form such an interpretation, data was gathered following strategies for classroom ethnography. To ground our study we used Lensmire's (1994) ethnographic research design to document classroom practice and learning. Three specific pieces of his design were used:

(1) Field notes: composed of narratives of the day's teaching, as well as students' and teachers' reflections on specific pedagogical and methodological problems and issues.
(2) Teacher and classroom documents including: lesson plans, lists of rules and procedures, and forms (Burton, 1985 as cited in Lensmire, 1994) enabled us to reexamine what we hoped would happen, in order to juxtapose these hopes against what actually occurred.
(3) Student produced writing and project artifacts: brochures, intra-university memos, press releases, project designs, as well as exploratory and reflective essays. This data were used as benchmarks and as indicators of progress.

The case study's population consisted of 28 undergraduate College of Agriculture students enrolled in a 3-credit-hour, semester-long course about leadership. The learners were juniors and seniors from a variety of majors including Agricultural Education, Agricultural Studies, Agricultural Communications, Agronomy, and Animal Science. The course was predominantly male, with 19 males and 7 females. Most students were from rural communities. All students were of Northern European-American descent.

This study was based on strengthening classroom teaching practices and student learning. Analysis involved our own and student reflections on the course in a continuous process of accommodation to scaffold learning. Brookfield (1995) has suggested that educators and students alike need to reflect on their actions to make sense of their experiences. Following each class we immediately analyzed the day's events based on our field notes and recollections. As we debriefed, our discussions were based on (1) what we expected to happen during a particular class session and (2) selected student reflective writings that focused on their reactions, interpretations, and understandings of class events. This multifaceted approach triangulated the findings and conclusions of the study.

Because students were unaccustomed to reflective thinking (Williams & Driscoll, 1997), we provided step-by-step reflective prompts--based on seminal leadership theories- that queried students about their involvement, feelings and engagement in the service learning project (SLP). The writing prompts served to guide the student reflections as they independently struggled to make sense of what was happening in class. They handed in their responses to the instructors without signing them. We hoped that this anonymity would provide more comfort as they expressed their thoughts and concerns. As we analyzed these documents, we looked for patterns and/- or trends in an effort to accommodate the students needs with respect to the course and the SLP. At the beginning of the next class session, students each received a verbatim typed copy of the class's reflections. Next, instructors and learners jointly analyzed the group's responses to determined patterns and trends of the reflective statements. As a result of this process, the class cooperatively worked to adjust their efforts with the SLP. In addition, this process aided the instructors in reevaluating their efforts to scaffold student learning and served as a means to check the trustworthiness (validity) of our interpretations. Further, this process assisted learners in identifying their progress in traversing through group developmental stages.

Additional data (i.e. papers, interviews) were analyzed by coding the results based on the Tuckman and Jensen theory. Our analysis was checked for "confirmability" or the believability of our conclusions (Guba and Lincoln, 1989, p. 242) through peer debriefing in the form of an academic departmental seminar. In addition, we conducted a student member-check by presenting our analysis of the class's progress framed by the Tuckman and Jensen theory. Students commented on the presentation through reflective writing, which contributed to the "dependability audit" (Guba and Lincoln, 1989, p. 243).

The course was based on the premise that learning must be contextualized and occurs through communities of practice. The ideas explained the expectations of students in the course:

(1) The course's culminating outcome was, "to acquire understandings and skills necessary for effective leadership and group participation."
(2) The Service Learning Project served to provide a context for learning leadership concepts, skills, and theories.
(3) The SLP's goal was to: "Surround Curtiss Hall [the building that the course was taught in] with thousands of donated perennial flower bulbs" (Trexler, 1999).

Based on these expectations, the learners placed themselves in small groups ranging in size from three to eight, where they outlined individual responsibilities for their respective groups. These responsibilities were shared with the entire class through small group presentations of action plans.

Students additionally reflected on these activities through writing assignments on topics such as: defining leadership, interviewing friends and leaders about their perceptions of power and authority, studying the leadership characteristics and styles of great past leaders, reflecting on the accuracy and implications of personality inventories, and comparing compulsory groups to volunteer groups. The students also participated in oral reflection, through in-class large and small group discussions. The students reported that these activities "tied everything together" (student reflective writing, 12-6-99).

Findings

In this section, the researchers first describe the major characteristics of the Tuckman and Jensen stages of group development as defined by Brunette (1997). Next, we describe what happened in the course and how students and teachers reacted to the events that unfolded as the community of practice formed. Interspersed in the chronicling of events are our interpretations as teacher/researchers.

The forming stage can be characterized as a time when participants get to know one another in relation to the current situation (Burnette, 1997). In this agricultural leadership course, the first days were used to introduce the learners to the expectations of the course and to introduce them to the SLP goal. After the presentation we asked the students (1) how they were going to accomplish this, (2) who should be contacted or talked to and (3) who would do the contacting?, and (4) what groups the students wanted to create and be a part of? As a result of this probing, the students "…kind of split themselves up pertaining to what they wanted to do and what they were good at"(student interview, 12-4-00). They split themselves into small groups consisting of four to six students.

Observations of the groups at this time highlighted their immediate and uncoordinated attempt to accomplish their perception of the task.

> They sat in their usual small groups and worked independently and hastily towards finding an immediate solution to a very large-scale problem. One group went to the campus administration building information desk to find out where to go. A second group felt they were already connected [to the right people on campus] and headed straight for the phones. A third group went to look at the existing landscaping and came back with an approach to planting and landscaping the assumed area. A fourth group wandered around the building looking for an appropriate planting site… A fifth group stayed in class to find a bulb seller located within the community (field notes, 9-8-99).

At this time, not all students reacted positively to these activities, one student stated what he liked least about the class was:

> …the way time is wasted and the way the teachers feel the students have all the time in the world to work on this class… instead of teaching a class on leadership, and showing what it is, we are supposed to do it on our own (student reflective writing, 9-24-99).

Acknowledging this frustration, we were also excited at their comprehension of their responsibility to 'do' leadership. Following this initial thrust into the project, the students returned to the classroom and began to share their conceptualization of the project. However, they quickly realized that each group had a differing interpretation. The result of these varied interpretations led to the storming stage.

Burnette (1997) suggests that participant's actions are in competition and/- or conflict with one another during the storming stage. This occurs because of differing ideas about the task at hand and because groups fear that they may not be able to meet the expectations of other group members. In addition to this conflict and fear, interpersonal relationships are developed and tested during this stage.

In our class, students had various ideas of what needed to be done and/or what was happening with the project. These varied versions and different approaches to the project created a high level of storming amongst the class members. Part of their frustration concerned the level of participation of their fellow students. Students suggested that teachers should take responsibility, or leadership, for involving less active class members. One student stated that "for those who are not very involved you [the teachers] could find out what they are interested in and then delegate a job to them. This would force them to get involved and do something…" (student reflection, 9-27-99). Instead of taking charge of the student learning expereince, we--the teachers- tried to heed the insight of other students who called for more communication. An example of a comment made at this time is " we can make progress by talking to other groups and taking action…" (student reflective writing, 10-4-99). Following the advice of students, we provided opportunities for others to voice their concern. Many expressed anxiety about the scope of the project: "I think this project is too big, it will not get done…" (field notes, 9-22-99). In addition, students were doubtful that university administrators would okay the project (field notes, 9-14-99). The myriad of concerns and viewpoints created an environment of fear and rebellion amongst the learners, both with each other and with us (the teachers).

The learner's skepticism about the successful completion of the project caused a minor rebellion to occur when the principal instructor was gone and the secondary instructor was in charge. Upon his return, the following events occurred:

> the students [had] changed the vision of thousands of bulbs to hundreds of bulbs. He told the students they weren't visionary enough. They responded in saying that it was overwhelming and presumptuous to ask the community for help in getting thousands of bulbs. He shook his head no. The students responded with eye rolling and talk amongst their small groups about how unreasonable and unrealistic he was being (field notes, 9-17-99).

A few days after this confrontation, the university landscape architect visited the class and shared her expertise about landscape design, bulb numbers (which were in agreement with the primary instructor), and how to get university "Okays." She suggested sequential steps to the learners for completion of the project. A student reported "I think that things are starting to flow a lot better now… before everyone had a negative outlook on the project, now the class's heads are starting to come up" (student reflective writing, 10-15-99). Another student noted "I feel that we have made good progress… although we need to take action. We need to get things lined up-bulbs, tools transportation, scheduling, donations, etc." (student reflective writing, 10-4-99). The groups became more focused and efficient as they directed their efforts. As their "heads started to come up;" they moved into the norming stage.

The transition from group member's independence to dependence furthers the development of a community of practice. As participants recognize the abilities of others and the benefits of working together, they develop rules and requirements for the project and each other (Burnette, 1997). While many of the students were storming a few had taken the initiative to begin their leadership tasks and had created an informational brochure and letter. These items were shared with the class for revision. This tangible visualization of the project helped many of the learners realize that this project was going to happen (teacher's reflection, 10-6-99). Each student was given a copy of the brochure and the accompanying informational letter to make revisions and/or additions. Following the large-group editing process, final copies were made and used to solicit funds. These events allowed the university communications group to begin soliciting administrative "Okays." As the "excited Okays" came in from deans and university administrators, they were shared with the class. Seeing the possibility of the project coming to fruit, the learners re-formed their groups' identities and responsibilities according to their personal interests and experiences. After they reformed, students developed action plans. One learner observed "at first I was a little skeptical because I wasn't sure how everything was going to work or fall into place but now things are going good. It seems each group has taken an active part in doing things to get this under the way" (student reflective writing, 10-15-99).

Yet, with all of the organizational action of the norming stage, some students were still concerned with the division of responsibility: One student stated "we need to communicate more and discuss; the work needs to be distributed more…. Some people are getting overloaded with work" (student reflective writing, 10-15-99). Students also commented on their classmate's lack of responsibility and understanding of the project:

> We (as a class) have segmented into 2 groups I believe. 1. People who are really excited about the idea but aren't facing some of the key issues; instead they are focusing more on the issues such as permission, recognition, brochures, etc. The other group is more concerned with time frame, logistics, such as are we going to have what we need and how exactly is this going to get done… (student reflective writing, 10-15-99).

To ease these concerns the instructors allotted whole class periods and daily portions of class time for learner discussion and sharing. We continued to use reflective questioning to solicit information. Communication between small groups and individual students catalyzed students to "…dig in and get things done" (student reflective writing, 10-15-99). These conversations established norms that organized the groups for the performing stage.

The performing stage is classified by interdependence between members and groups. Participants adjust to meet the needs of the group to achieve the goal (Burnette, 1997).

> As the process of the project started moving along, it was because some of the group members started taking responsibility. This is one of the main ways the group has changed. Different members are starting to take responsible roles in achieving the project's end (student reflective writing, 10-15-99).

The SLP afforded students opportunities to learn in many different situations. However, students continued to voice concern over the lack of involvement of their classmates. One learner shared the insight "I think everyone is involved, some less than others. The result is, some people are pulling more than their share of the weight" (student reflective writing, 10-29-99). Recognizing this, we asked the learners to discuss and reflect on what could be done to overcome this inequality (field notes, 10-20-99). One student responded:

> I feel that everyone is involved. Some people want to do more of the grunt work outside, while others may want to do the stuff involved within the class. If you [the instructors] feel that someone is not doing their full potential I think you should try to help them out by either finding something for them to do or help them get started and work with them until they can get a grasp on the job or task they are to do. Right now some of [my] classmates aren't doing much, but maybe they are waiting for more of the grunt or manual labor (student reflective writing, 10-20-99).

Taking comments like this into account, the instructors began to work specifically with those students who seemed to not be fully participating. Even with this 'help,' we did not feel that all students engaged in the project (teacher reflection, 10-25-99). Although this concerned lingered, the outcome of the students' efforts was a two-day planting experience. Students led themselves in planting 8,500+ bulbs purchased with $3,500 in funds donated by university administrators, community businesses, and university employees. Planting the bulbs was a:

> capstone rather than an introductory team building [activity]. I think it was more effective in that they knew each other in very different lights. Yet, they all understood and were comfortable, to a certain extent, with each other and what their roles were. They all had vested interest in the project whether it be for grades, personal satisfaction, or the fact that they had worked so hard to make it come to pass (field notes, 11-11-99).
>
> A student later reflected on her participation in the SLP stating: "I felt that most everyone was involved, although it was frustrating to see people not active. I'm very satisfied with this class, and learned several life skills to use toward my career. Our jobs require us to work in groups and through this project we have learned the stages that groups go through. Thank you for making this class very beneficial" (student reflection, 12-1-99).

The students were excited about their successful experience and breathed a sigh of relief in accomplishing an enormous task. Yet, following the planting the adjourning process began.

Burnette (1997) states that "termination of task behaviors and disengagement from relationships" marks the adjourning stage of group development. Most groups include some type of celebration to mark the completion of the project and to give participants an opportunity to terminate their involvement in the group.

The primary adjournment to the planting day was a visit by the students to the local bar. Students reported that many of their classmates showed up and that the main topic of discussion was the SLP and what they had learned (student essay on reflection). Final formal adjournments were made through a thank you/congratulatory letter from the primary teacher to the students, and a class party at his house. Thus, the learners "closed with a little party and a little sadness" (student reflection paper, 12-1-99). At this point, while learners were excited about accomplishing their goal, they also became disengaged from the course. A feeling of "what do we do now?," (student reflection paper, 12-1-99) was felt by all in the seven remaining days of class.

In response to the question "what do we do now?," the final days of the course were spent in reflection on the SLP. Each day, students were randomly grouped and then assigned a Tuckman and Jensen (1977) stage of group development. Students were instructed to identify what happened in the stage, who the leader was of each event in the stage, and what leadership style was used by a leader in specific situations found in the SLP. A student shared the comment that this "tied everything together" (field notes 12-6-99). Through specific guided reflection learners were able to evaluate what they had experienced and then cognitively relate personal experience to leadership theories (Merriam & Clark, 1991). However, reflection was not a high point for all learners. One student reported that his:

> analysis of being a leader is that it is natural – leaders step-up. Some talk more to make a point, and others lead through example… they shined through projects. [And that] this class is 75% analysis of feelings. The project could've been done in half the time if they [the instructors] would have cut through the bullshit and got things done rather than this analysis (12-6-00).

Nevertheless, all of the literature reviewed (Brookfield, 1995; Kunin, 1997; O'Connell, 1990;Williams & Driscoll, 1997) strongly encouraged the instructors to require students to reflect on their experiences. Therefore, students were required to complete the reflective exercises. We did however, change the structure of the reflective process to aid the students in their reflective efforts and to share our analysis and feelings of what happened during the SLP.

The educators created a slide show chronicling the project. This slide show served as (1) the concluding act of adjournment for this project, (2) another way of reflecting, and (3) a validity member check on the analysis of the course. Following the presentation, students responded with their impression. Two students comments are representative of their classmates:

> I believe that this study or the information presented was accurate. I think it should be emphasized that you can learn basic skills at a job, but something like this project gives you skills that you will remember for a long time. These skills aren't something that you have to struggle to remember; they just stick (student reflection, 10-6-99).

> I had never noticed [the sad good-byes] but if I look back on it, I think we all were kind of sad. Maybe not sad but maybe shocked. Shocked that the project some of us thought was impossible, was actually finished and better than the first plan (student reflection, 10-6-99).

Learners also reflected on the course and their experiences through two short essays on the impact and their involvement in the SLP. These final reflections concluded their involvement in the course and "helped to explain why we did the project and tie[ed] things together well" (student reflection, 12-6-99).

Conclusions/ Implications

Based on the theoretical framework of group development and the findings of this case, we draw the following four conclusions:

(1) Learning communities undergo five definite stages of development. Considering the time requirements for most university courses, reflective questioning and discussion can be used to assist students with their transitions through the stages.

(2) Service learning projects must be large enough to seem almost insurmountable to the learners, but manageable enough to be completed. This is critical because it insures that high levels of learner engagement and participation can be achieved by requiring a variety of tasks to complete a SLP.

(3) Learner interest and engagement in the SLP will be greater if the SLP deals with a medium and service that is familiar to them. In this case study some of the agricultural leadership students were familiar with planting and growing things-- thus, they worked on bulb layout and organized materials for planting. Others were more comfortable with

publishing and designing informational literature and therefore involved themselves in that way.

(4) Reflection serves as both a catalyst and a learning tool. Although learners voiced much frustration with continual reflections, they were also awakened to learning as they reflected in essays and discussions.

Implications from this study are directly related to the implementation of learning theory. Theorists argue that significant learning occurs when people engage in group activities and communicate about issues that are important to them (Johnson, Johnson & Smith, 1991; Lave & Wegner, 1995; Vygotsky, 1986). However, the process of learning in groups can be a rough experience for both learners and teachers. Nonetheless, understanding that all learning communities struggle through predictable developmental stages can aide teachers and learners as they make sense of interpersonal relationships and their individual roles within the process. Furthermore, recognizing that these stages exist allows educators to facilitate the process through reflection, group sharing, and heightened communication efforts. Because agricultural leadership education at the university level is challenged to move to a new paradigm, service learning, well-planned reflective practices, and an understanding of Tuckman and Jensen's group developmental stages can help educators shepherd communities of practice to meet ideals of this new paradigm.

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Journal Paper No. J-18903 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project No. 3306, and supported by Hatch Act and State of Iowa funds.

Steering Through Turbulent Waters While Developing A Community Of Practice: Struggles In An Undergraduate Leadership Course Based On Service Learning

A Critique

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Using guidelines by qualitative experts (Guba, Lincoln, Hammersley, etc.), the researchers have conducted and reported an excellent classroom ethnographic study. Staying within the page limitations, they have also produced what appears to be a complete reporting of the study–oftentimes a challenge in reporting qualitative research.

If anything could have been added to the reporting, it would have been a discussion of the topic areas taught at critical "turning points" in the class. Perhaps as a result of this study, consideration should be given to reordering topic delivery to offer students insights into what they are experiencing and feeling during the team development stages.

Likewise, it would have been helpful to know if the upper-level leadership course had any prerequisites. Student course work and previous leadership experiences likely had some impact on student approach and role in the service learning project. Additionally, it is recommended the instructors consider adding a formal peer evaluation process that is used midway and at the end of the service learning project. This evaluation could include several dimensions and, in my experience, provide valuable insights into student engagement as viewed by peers. Midway through the semester, the evaluation also reminds students of the performance expectations associated with the service learning project.

Service-learning leadership courses are being taught in a number of agricultural education departments nationally. They are not only excellent vehicles for developing leaders but engage students in communities, and offer universities opportunities to extend beyond their campus boundaries. It is recommended that faculty in agricultural education departments offering service learning leadership courses consider a national "show and tell" seminar. The seminar would be for exchanging of ideas among those already offering these courses, and an opportunity for those considering adding these courses to dialogue.

Personality Types and Final Grades in Group Organization and Leadership Development

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Abstract

The purpose of this study was to determine statistical relationships existed between final course grades and personality types for students enrolled in the College of Agriculture course, Group Organization and Leadership Development (GOaLD), during 1995 to 1999. Personality types were measured by the Myers-Briggs Type Indicator. The majority of respondents preferred the ISTJ or ESTJ type most often. Significant, positive, low associations resulted between final course grades and the judging and sensing preferences. College of Agriculture educators are encouraged to assess their own personality types to find convergence with the reported types of their students. Educators should assess how well they incorporate knowledge and understanding of personality types in the teaching and learning process, especially when using the problem solving method for small group activities. Continued study is necessary with larger and more diverse groups of students to more fully understand the role personality typology plays in the teaching and learning process. Leadership courses that focus serious study in personality typology are providing students with the requisite skills needed to succeed in agribusiness and educational settings.

Introduction

Several research studies have been completed to increase our understanding of personality types and their effect on learning styles. Personality types, as determined by the Myers-Briggs Type Indicator® (MBTI), are a manifestation of the theory for psychological types proposed by Carl G. Jung (1921/1971). Jung believed that when our minds are active, we are involved in one of two mental functions: 1) receiving (perceiving) information or 2) organizing the information so that we can reach a conclusion (judging). Jung further observed that "how we perceive information" occurs through sensation and/or intuition and most people choose to judge new information through thinking or feeling processes. Finally, Jungian theory postulates that we focus our energies either through the external world of people, experiences, and activities, or we focus internally on ideas, memories, and emotions.

Myers and McCaulley (1985) refined the MBTI to make Jung's psychological type theory more meaningful and useful in everyday life. The MBTI consists of four items, which are the result of combining eight possible personality factors. When combined in totality, these eight factors result in 16 distinct personality types. Each self-reported type describes a likely behavior, as a result of perceiving and/or judging a given situation. Research shows the resultant behavior is orderly and consistent over time and is correlated to a person's reactions, interests, values, motivations, and skills (Myers & McCaulley, 1985). If students perceive information, draw conclusions, and react differently while learning, then a deeper understanding of their personality types may improve teaching effectiveness, increase learning among all students, and have an effect on academic achievement as determined by final course grades. The very least university students and educators can gain from advanced understanding of personality types is an awareness of how each personality type contributes or detracts in a cooperative learning environment.

Conceptual Framework

Jung's theory of psychological types was formally described through Myers' (1962) development of the MBTI. Prompted by the mass destruction of human potential during World War II, Myers began developing an indicator to give individuals access to the benefits she found in understanding and appreciating different psychological types (Myers, 1998). The resultant work of more than 50 years of research and development has produced the MBTI, which is the most widely used instrument for understanding normal personality differences. Jung's theory and the MBTI do not describe static categories, but rather dynamic energy systems with interacting processes (Myers, 1998).

Based on the development of the MBTI, Barrett (1985) conducted a study to determine the personality profiles of students and faculty in the college of agriculture at the University of Nebraska-Lincoln (UNL). Barrett found that agricultural students ($\underline{N}$ = 413) were proportionately more introverted (I-54%), sensing (S-84%), thinking (T-69%), and judging (J-57%) than extraverted (E-46%), intuitive (N-16%), feeling (F-31%), and perceptive (P-43%). Type theory indicates that ST and SF types prefer "practical application of facts" more often than do NF or NT types (Myers, 1998). Does this theory imply that agricultural students are more apt to be ST and SF types? Does it mean that the very nature of studying agricultural concepts provides an attractive learning environment for ST and SF types? Regardless of the answers to these questions, few educators would dispute the fact that an increased "teamwork, cooperative learning, leadership and communication skills" are the primary attributes agricultural students should attain prior to seeking employment in the agribusiness industry today. How well do we incorporate knowledge of typology and its affect on group dynamics in current leadership courses?

Barrett, Sorensen, and Hartung (1987) conducted a study of students enrolled in the college of agriculture at UNL. Their purpose was to describe characteristics of students and faculty in order to develop better teaching strategies. The sample included 2888 students, representing all agricultural majors, and 126 faculty members. The researchers compared the UNL student base data to data acquired from the Center for the Application of Psychological Type (CAPT). The CAPT data were a compilation of all university students who had completed the MBTI during the years 1971 to 1982 ($\underline{N}$ = 27,156). The researchers found that UNL agricultural students were not described as "typical" university students. CAPT data showed the typical university student was more extraverted, intuitive, feeling, and judging (ENFJ) than were UNL agricultural students who were more introverted, sensing, thinking, and perceptive (ISTP). Barrett, Sorensen, and Hartung concluded that students were "practically oriented" with preferences for information that could be applied to a present use. Again, type theory illustrates that ST type people prefer learning through a "doing, hands-on approach" rather than through abstract, theoretical, and conceptual approaches. The unfortunate circumstance is that a majority of university instructors are NF types (similar to the "typical" university student) who prefer working with abstract concepts and theories (Ditiberio & Hammer, 1993).

Raven, Cano, Garton, and Shelhamer (1993) documented that preservice agriculture teachers at Montana State University favored the ISTJ, ISTP, or ENTP personality types (n = 18). In the same study, preservice agriculture teachers at Ohio State University favored the ESFJ, ESTJ, or ISTJ personality types (n = 25). Cano and Garton (1994) found additional evidence that preservice agriculture teachers favored the ESTJ (23.2%), ISTJ (18.3%), and ESFJ (13.4%) personality types (n = 82). Clearly, these studies illustrate that preservice agriculture teachers have a predisposition for being ST types. How do these typology studies with agricultural respondents compare with similar studies conducted in non-agricultural settings?

Vomela (1994) studied junior and senior construction engineering students to ascertain the relationship between preferred teaching methods, personality type, and final course grades. The discussion teaching method followed by an oral report was favored by extroverts, intuitives, and by judging individuals. The discovery teaching method was favored by extroverts and by thinking individuals. Sensing individuals favored lectures more than did their intuitive classmates. The judging and thinking type students had significantly higher final course grades than did their perceptive and feeling type peers. In a study of 886 prospective K-12 educators, Sears, Kennedy, and Kaye (1997) found that sensing-feeling-judging types were significantly more inclined to complete their preservice teacher education programs, than were students from any other personality type combinations. These results support the aforementioned agricultural education studies (Raven, et al., 1993; Cano & Garton, 1994).

Personality type may have much to do with organizational and leadership skills for university students preparing for the workforce. During their academic careers, students may be exposed to a variety of teaching styles, assignments, projects, and exams, and may experience a variety of instructors' personality types as well. The interaction effects of these variables could be beneficial for some students, yet severely hamper the learning environments for others. Darst (1998) studied 149 student leaders with regard to their personality type, gender, and participation in student organizations. The findings revealed that student leaders' preferred types were thinking and judging, which was disproportionately higher than their peers' preferred types. Kretovics' (1998) study of 132 graduate business students placed particular emphasis on student learning outcomes. Results showed that extraverts had significantly higher means on selected Learning Skills Profile categories (goal setting, initiative, leadership, and relationship) than did their introverted peers. Graduate students preferring intuition scored higher on initiative and sense making than did those with a preference for sensing. The mean for sense making was significantly higher for students with a preference for perceiving rather than judging.

University students may not acquire formal decision-making and communication skills if they do not remain in school where opportunities exist for discourse among peer groups. Fremont (1998) studied the relationship between personality types and the academic persistence of college freshman. Results of the study indicated that students who make decisions by perceiving rather than by judging had a higher likelihood of becoming a college dropout. Introvert personality types who learn by sensing had higher educational stress while extravert types who made decisions by perceiving had higher predicted academic difficulty.

While literature both in and out of the agricultural domain suggests that nearly every personality type is represented among university students, scant research suggests how to use this knowledge in the classroom setting. As students prepare to enter the workforce, what strategies are being developed to incorporate personality type knowledge systems into everyday routines? How can students benefit from knowing "who they are" and "how they will interact" in a group setting? Agricultural employers demand people skills from current and future agricultural graduates. "People skills, or the ability to understand and interact with customers, wholesalers, and retailers is the single most important attribute your students can bring to an interview in the Kroeger Company. If they can understand why people are the way they are, and use that knowledge to Kroeger's marketing advantage, I'll teach your students everything else about the grocers' business world" (J. Antolini, personal communication, March 17, 1999).

Purpose and Objectives

The purpose of the study was to investigate relationships between final course grades and personality types for agriculture students enrolled in *Group Organization and Leadership Development* (*GOaLD*) during 1995 to 1999. The research questions that guided this study were:

1. What are the MBTI personality type profiles of students in the *GOaLD* course?
2. What relationships exist between final course grades and MBTI personality type components, gender, class status, or college major?
3. How do *GOaLD* students' personality types compare to other students in other agricultural education studies and in national data banks?

Procedures

Descriptive survey methodology and a correlational design were used in this longitudinal study. The dependent variable was final *GOaLD* course grades. The independent variables were MBTI personality type components, gender, class status, and college major. The accessible population was all students (N = 215) who enrolled in the course from 1995 to 1999. Results of this study were generalized only to the convenient sample (n = 215).

GOaLD was an open-enrollment course for all university students. The course may be taken by any student to satisfy a university requirement for three of twelve credits needed for graduation in the social and behavioral sciences. The course meets weekly (15 weeks total) for two 90-minute sessions. The *GOaLD* course was conducted using a "group-centered, action-oriented" approach to learning. Academic performance in the *GOaLD* course consists of four small group (4 students/group) projects, two small group presentations, five research journal critiques (individual basis), five quizzes (individual basis), and "essay form" midterm and final examinations (individual basis). Assignments and assessments were consistent with understanding and applying the knowledge gained in studying concepts from *Group Organization and Leadership Development*.

Students enrolled in the *GOaLD* course agreed to have their personality profiles assessed using the MBTI Form G. The MBTI was administered to all students enrolled in the course during the fifth week of each semester from fall 1995 to spring 1999. The instrument was completed during class and all data forms were collected prior to class dismissal. Students were given as much time as needed to complete the MBTI and each student identified him/herself with a six-digit Social Security Number to provide confidentiality of the results. Other than each respective student, only the course instructor viewed, hand scored, and recorded the raw scale scores for each MBTI instrument. Group results were discussed during succeeding class sessions and individual results were discussed with each respective student.

The MBTI has four separate indices that when viewed individually, illustrates one of four preferred choices for describing how people perceive and react in a given situation. A brief description follows, based on the MBTI (Myers & McCaulley, 1985).

Extraversion-Introversion (EI): the EI index describes whether a person orients him/herself towards the outer world (E), by focusing on people and objects; or by orienting oneself towards the inner world (I), where the focus is on concepts and ideas.

Sensing-Intuition (SN): the SN index describes a person's choice in how one perceives new information. A person may prefer to gather information by observing facts or experiences through one of the five senses (S). When information is gathered through meanings, relationships, and/or possibilities, the preference is one of intuition (N).

Thinking-Feeling (TF): the TF index describes how a person draws conclusions or makes decisions. If a person relies on logic to make decisions, the thinking (T) preference is most prevalent. When personal, subjective, and/or social values are the basis for decision-making, a person is relying on the feeling (F) preference.

Judgment-Perception (JP): the JP index describes the process one uses to confront the outer world. That is, one who prefers judgment (J) has a preference for using either T or F in dealing with the outer world. If a person chooses perception (P), he/she has a preference for using S or N in dealing with the outer world.

Individual students' final course grades, reported as percentages, were acquired from the *GOaLD* instructor's database. Group-centered assignments comprised 50% (400 points) of the final course grade. Individual assignments (quizzes, journal critiques, exams) comprised the remaining 50% (400 points) of the final course grade.

The MBTI is content valid and reliable for college students (Myers & McCaulley, 1985). In addition to 94 forced-choice questions and word pairs (Form G Self-Scoreable), the MBTI included a demographics section requiring students to record their year in school, current major area of study, and gender. Descriptive statistics and bivariate analyses described the data.

Findings

Table 1 shows 141 males (65.6%) and 74 females (34.4%) participated in this study. Students in their senior year (n = 73) made up the largest number by class status with juniors (n = 55), freshmen (n = 40), sophomores (n = 37), and graduate students (n = 10) following in respective order. Agricultural education students (n = 75) represented the largest group by discipline. The mean age of *GOaLD* students was 20.95 years (SD = 2.59). The majority (79.1%) of *GOaLD* students achieved a final course grade of "B" or better. Overall final grades had a composite mean of 86.15% (SD = 9.99).

Table 1.
Descriptive Statistics for Demographics for *GOaLD* 1995-1999 Course (N = 215)

Factor	Label	Freq.	Percent
Gender	Male	141	65.6
	Female	74	34.4
Class Status	Senior	73	34.0
	Junior	55	25.6
	Freshmen	40	18.6
	Sophomore	37	17.2
	Graduate	10	4.7
Major	Agricultural Education	75	34.9
	Animal Science	46	21.4
	Wildlife & Fisheries	25	11.6
	Outside COA[a]	15	7.0
	Plant Science	15	7.0
	Forestry	12	5.6
	Agribusiness	11	5.1
	Landscape Architecture	6	2.8
	Parks & Recreation	5	2.3
	Family & Consumer Sciences	3	1.4
	General Agriculture	2	0.9
Grades	(B) 83-91.9%	101	47.0
	(A) ≥ 92%	69	32.1
	(C) 73-82.9%	25	11.6
	(F) ≤ 64.9%	11	5.1
	(D) 65-72.9%	9	4.2

[a] Majors outside the College of Agriculture included students from Engineering, Communication Studies, Exercise Physiology, and Business/Marketing

Bivariate analyses were performed on final course grades and MBTI personality type components, gender, class status, and college major. Davis' (1971) convention was used to describe the magnitude of relationships. The judging preference (r = .22) had a low, positive, significant relationship with final grades. This association was followed by a low, positive relationship for the sensing component (r = .17). Agricultural education students' final grades were significantly positive (r = .17). Low, negative, significant relationships existed between final grades and the perception (r = -.20) and intuitive (r = -.16) personality type components. The variable gender had a low, negative, significant relationship (r = -.18) with final grades. Significant, low, negative associations were evident for students from parks & recreation (r = -.13) and family & consumer sciences (r = -.14).

Numerous moderate and low relationships (positive and negative) were revealed between gender and the thinking, feeling, and judging type components. Additional low relationships (positive and negative) existed between freshman and the extravert/introvert type components and between sophomores and the thinking/feeling type preferences. Low positive and negative relationships were evident between most majors and all personality type components except for the thinking type preference (Table 2).

Table 2.
Bivariate Correlation Coefficients for Final Course Grades, MBTI Personality Type Components, Gender, Class Status, and Major (N = 215)

	Correlation Coefficients								
Variable	Grades	E	I	S	N	T	F	J	P
Grades[a]		-.05	-.02	.17*	-.16*	-.07	.10	.22*	-.20*
Gender[b]	-.18*	-.08	.10	.09	-.07	.34*	-.39*	-.15*	.10
Freshman[b]	-.12	-.13*	.14*	.01	.02	-.05	.00	-.05	.02
Sophomore[b]	-.09	.06	.00	-.03	.07	-.14*	.18*	-.03	.05
Junior[b]	.04	.04	-.06	.10	-.09	.13	-.08	.05	-.04
Senior[b]	.08	.03	-.05	.06	-.00	.10	-.11	.01	-.01
Graduate[b]	.13	-.01	-.01	-.04	.00	-.12	.08	.02	-.02
Animal Science[b]	-.08	.01	-.02	.05	-.07	.01	.04	.10	-.09
Agribusiness[b]	-.03	.14*	-.10	.09	-.05	-.01	-.01	.00	.01
Ag Education[b]	.17*	.08	-.08	.09	-.07	-.06	.10	-.10	.09
Family Science[b]	-.14*	.14*	-.17*	-.16*	.16*	.01	-.06	-.16*	.15*
Forestry[b]	-.04	-.18*	.18*	-.06	.09	.01	-.06	.03	.00
General Ag[b]	-.05	.05	-.06	-.00	-.00	-.04	.04	-.09	.07
Landscape Arch[b]	-.08	-.01	.00	.05	-.06	.12	-.14*	.08	-.09
Parks/Recreation[b]	-.13*	.10	-.07	-.08	.11	-.09	.08	-.11	.09
Plant Science[b]	-.08	-.04	.01	-.19*	.18*	-.00	-.02	.03	-.05
Outside CoA[b]	.09	-.09	.11	.04	-.04	.00	-.04	.03	-.03
Wildlife/Fish[b]	.06	-.10	.10	-.01	-.02	.08	-.07	.04	-.05

Notes: **E** = Extraversion; **I** = Introversion; **S** = Sensing; **N** = Intuition; **T** = Thinking; **F** = Feeling; **J** = Judging; **P** = Perception.

[a] Interval variable; reported as Pearson correlation coefficients.

[b] Dichotomous nominal variable; reported as Point-biserial correlation coefficients.

$*p<.05$

Data in Table 3 indicate the rank order of MBTI personality type profiles by study and the national data base for all college students regardless of major. The national database was derived by including all students who have taken the MBTI and is the only available source of MBTI personality type profiles for college students (G. Macdaid, e-mail communication, February 10, 1999). Students who enrolled in the *GOaLD* course favored the ISTJ personality type (18.6%) most often. When viewing the MBTI personality profiles from other studies (Cano & Garton, 1994; Barrett, 1987; Macdaid, 1986) the ISTJ and ESTJ types have consistently ranked near the top in terms of most preferred personality types for all college students, regardless of discipline (Table 3).

Table 3.
Distribution of MBTI Personality Type Profiles by National College Database Populations and Agricultural College Student Samples

MBTI Type	CAPT[a] (N = 27,156)		GOaLD (N = 215)		Cano & Garton[b] (N = 82)		Barrett[c] (N = 2888)	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
ESTJ	2879	10.6	24	11.2	19	23.2	410	14.0
ESFJ	2875	10.6	14	6.5	11	13.4	177	6.0
ISTJ	2573	9.5	40	18.6	15	18.3	496	17.0
ENFP	2496	9.2	15	7.0	5	6.1	153	5.0
ISFJ	2352	8.7	15	7.0	2	2.4	211	7.0
ESFP	1767	6.5	14	6.5	4	4.9	158	5.0
INFP	1495	5.5	6	2.8	3	3.7	130	5.0
ENTP	1363	5.0	15	7.0	2	2.4	105	4.0
ISFP	1351	4.9	9	4.2	2	2.4	160	6.0
ENFJ	1309	4.8	7	3.3	1	1.2	63	2.0
ESTP	1257	4.6	23	10.7	5	6.1	274	9.0
ISTP	1216	4.5	15	7.0	3	3.7	290	10.0
ENTJ	1199	4.4	3	1.4	4	4.9	71	2.0
INTP	1142	4.2	12	5.6	3	3.7	105	4.0
INTJ	997	3.7	3	1.4	2	2.4	50	2.0
INFJ	885	3.3	2	0.9	1	1.2	35	1.0
Total	27,156	100.0	215	100.0	82	100.0	2,888	99.0

Notes: Research studies are cited fully in references.
[a] Macdaid (1986); data were from 1971-1982 (males=12,637, females=14,519).
[b] Cano & Garton (1994).
[c] Barrett (1987); rounding of percentages does not equal 100.

Conclusions

Analyses revealed that sensing and judging types, as well as agricultural education students held positive, significant correlations to academic achievement in the *GOaLD* course. These findings support type theory that sensing individuals do well with details and are interested in realistic, practical, accurate facts. These types of students prefer skills they have already mastered and are quite conventional, even traditional; they do not like change or surprises. Ditiberio and Hammer (1993) contend that sensing types tend to do better on tests that allow them to demonstrate their mastery of facts and how ideas can be applied to real situations. This explanation may provide insight as to the reasons for *GOaLD* students' academic achievement in a course that is heavily dependent upon a "group-centered, action-oriented" learning approach. These data support earlier studies (Vomela, 1994; Sears, et al., 1997) in MBTI personality type and academic achievement.

MBTI personality type profiles of students in the *Group Organization and Leadership Development* course (1995-1999) were more closely aligned with the personality type profiles of students from all disciplines within colleges of agriculture and throughout universities (Barrett, 1985; Macdaid, 1986/1997). Students enrolled in the *GOaLD* course were categorized under the ISTJ type, as measured by the Myers-Briggs Type Indicator®. ISTJ students are characterized as introverted, sensing, thinking, and judging people. They are serious, quiet, and earn success by concentration and thoroughness. These (ISTJ) individuals are practical, orderly, logical, realistic, and dependable. Students in this study are well advised to heed Fremont's (1998) findings that introvert types who learn by sensing had higher educational stress. However, as future leaders, SJ types strive for stability, harmony, service, belonging, and they understand and conserve institutional values. On the downside, they focus more on negative outcomes and are often critical of others' mistakes. In an agribusiness or educational setting, this may pose problems for SJ types.

Students in all studies tended to be ST (sensing-thinking) types. Reality for ST people is what can be observed, collected, and verified by their senses. They use rational thinking techniques and make decisions based on logical analysis. The majority of "typical" university students relate academic achievement to the capacity for dealing with concepts and ideas, which are the principles enveloping the introversion personality type. Also, a capacity to understand abstract concepts and theoretical ideas—the basis for intuition—offers the university student a greater probability for academic success. Type theory predicts that NF personality types have a *relative* advantage, since their interests match academic tasks (Myers & McCaulley, 1985). If the greater majority of agricultural students are ST types, are they achieving as much academic success as their university peers in courses not originating from within the College of Agriculture?

Implications and Recommendations

Courses that are open to all university students, such as the *GOaLD* course, attract more sensing-thinking types than intuitive-feeling types. Leadership courses that focus serious study in personality typology are providing students with the requisite skills needed to succeed in agribusiness and educational settings. The more students know about themselves and how they will react in a group setting, the more they will know about how others, with different personalities, will interact in the same setting. In addition to assessing students' personality type profiles, agricultural educators should assess their own personality type. Doing so would help educators determine if convergence or divergence is occurring between their preferred type, its relationship to teaching and learning processes, and its affect on the personality types of their students.

College of agriculture educators in general and agricultural education faculty in particular, may want to assess how well we incorporate personality types in the teaching and learning environments for our students. Specifically, the problem solving approach is used frequently in our classrooms, but how well do we incorporate agriculture students' personality types? Myers (1998) offers a model derived from type theory "that the best decisions use both kinds of perception (S and N) in order to gather all useful information and both kinds of judgment (T and F) to ensure that all factors have been weighed" (p. 36). This model encourages participation from many personality types in the problem solving approach. For example, *Sensing* types perform best in "defining the problem" because of their tendency to view the situation in a realistic manner. *Intuitive* types contribute most during the "consider all the possibilities" stage because of their brainstorming ability. *Thinking* types are best at "weighing the consequences of each course of action" because of their ability to address solutions in a detached manner. When "weighing the alternatives," *Feeling* types are best able to offer judgment because they consider how each option fits with the groups' values. Following these steps, all student personality types should be encouraged to "make a final decision, act on the decision, and evaluate the results." This strategy not only has its advantages in the classroom, but educators can help students see its relevance in more realistic settings, like those found in quality control teams in the business world. Myers' (1998) model now serves as a foundation for group-centered, problem solving activities in the *GOaLD* course.

Educators need to ascertain how student personality type is affected by teacher personality type and vice versa. What relationships exist between teacher personality types, teaching styles, and the effect it may have on learning style? Continued study is necessary with larger and more diverse groups of students to more fully understand the role personality typology plays in the teaching and learning process. The door is open for all educators involved in leadership, educational or agribusiness courses to help students become more astute purveyors of the variables affecting group dynamics. A better understanding of personality types may lead to advanced understanding of leaders in the agribusiness and agricultural education world.

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Personality Types and Final Grades in Group Organization and Leadership Development

A Critique

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Use of the Myers-Briggs Type Indicator (MBTI) with agriculture audiences has led to the establishment of an excellent line of research. It has provided factual information upon which to base recruiting, retention and teaching strategies, and linked agricultural education research with research across many disciplines and career paths. Thus, the potential for comparison has definitely strengthened the impact of the research on practice in agricultural education. Future opportunities in strengthening the impact of MBTI research in agricultural education exist with wider inclusion of established behavioral measures in the research design (Values Intensity Scale, Motivation Sources Inventory, Influence Behaviors, etc.).

The use of some of the Jungian over the more established Kersian temperaments bears some discussion. In my opinion, the wealth of comparative, current research using the Kersian temperaments (NT, NF, SP, SJ) would offer greater insight than the comparative, current research using Jungian temperaments. Therefore, further analysis of this data set according to Kersian temperaments is recommended.

Knowledge of the instructor's typology coupled with knowledge of the typology of the students in a class, at a "macro" level, underscores the need for instruction variability. In the same way that learner's prefer to learn in certain ways, instructor's prefer to teach in certain ways. Intentionally varying delivery strategies enhances the likelihood that the instructor will connect with all students at some point in the class, hopefully more learning occurs as a result. At the "micro" level, knowledge of individual student typology can offer instructors insight into individual student reaction to lessons, assignments, and activities.

The researcher is encouraged to continue this line of inquiry by increasing the data set and advancing the MBTI research in agricultural education through the addition of other measures of behavior.

Leadership Styles of Florida's County Extension Directors: Perceptions of Self and Others

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Abstract

This study examined the leadership practices employed by Florida county extension directors (CEDs) using the Leadership Practices Inventory (Kouzes Posner International, 1997). The Leadership Practices Inventory (LPI) is the result of over 15 years of research in human leadership development conducted by the authors. At this time the instruments developers have evaluated over 12,000 individual leaders and have collected data from over 70,000 observers of leaders.

The purpose of this study was to identify leadership strengths and weaknesses as perceived by peers, co-workers, and the CEDs themselves. Kouzes and Posner identified five leadership practices that are prevalent in the leaders they studied. They are challenging the process, enabling others, inspiring a shared vision, encouraging the heart, and modeling the way.

The results of the study indicate that peers and co-workers perceive Florida CEDs at or above the 50th percentile in all five leadership practices. Observers ranked women significantly higher than men in four of the five leadership practices (challenging the process, inspiring a shared vision, enabling others, encouraging others).

The CEDs ranked themselves slightly higher than the observers in all of the leadership categories. Their self-perception was significantly different from the observers in only one category – enabling others. The female CEDs ranked themselves lower in four of the five leadership areas than did the observers while the male CEDs ranked themselves higher than the observers in every practice.

The author recommends examining other factors, such as education, experience, time in the position, management skill, prior training, and location, that may influence leadership style. The author also recommends providing in-service training for current CEDs and leadership preparation for new CEDs to identify strengths and weaknesses in leadership style.

Introduction and Theoretical Framework

Are effective county extension directors leaders or managers? Perhaps they should be a combination of the two! According to recent University of Florida position announcements, the roles of the "county extension director" include providing leadership for the county program, supervision and coordination of staff, developing and maintaining relationships with constituents, effective oral and written communication, maintaining advisory committees, ensuring availability of resources, planning, budgeting, managing personnel, and organization skills. Certainly there are a number of roles that county extension directors are expected to fill but are they adequately prepared to do so? County extension directors are often promoted to the position based on performance as a county extension agent, unfortunately that is not the lone criteria for being an effective county extension director (Lyles & Warmbrod, 1994).

Historically, training programs for extension administrators (including county extension directors) have included instruction in program planning, personnel management, resource allocation and budgeting, advisory committee organization and other managerial skills. At the same time, there has been a lack of training for extension administrators in leadership skill areas like participatory leadership, visioning, communication, innovation, empowerment, and constituent recognition.

One example of training provided for extension administrators is the Managerial Assessment of Proficiency (MAP) training program. The MAP program focuses on evaluation and ultimately development of management competencies, management styles, and personal values in extension administrators. MAP participants assess management behaviors, interpret their assessment, identify their strengths and weaknesses, and finally develop an individual plan for personal growth, training and development (Training House Inc. 1995). Although this training is beneficial for training in management, it seems to fall short on the leadership development needs of extension administrators.

Leadership can be defined in many situations and under varying circumstances. Yukl (1989) identified prevalent leadership theories and definitions based on the available literature in the field. Five areas surfaced, power and influence, trait approach, behavior approach, situational leadership, and an integrated approach. Easily identifiable and learnable characteristics were present in each. Leadership is "the art of mobilizing others to want to struggle for shared aspirations" (Kouzes and Posner, 1995, p.30).

Effective leaders possess a set of observable, learnable, practices that can change over time (Posner & Kouzes, 1996). They can be developed and nurtured. In fact, Posner and Kouzes posit that exposure to leadership opportunities is the best way to develop these skills. Followers need direction, trust, and hope from their leaders (Bennis, 1994).

While there is evidence that supports differences in leadership behaviors in men and women, there is an equally compelling body of evidence that refutes leadership behavior differences between genders. Current research is not clear as to whether leadership differences exist between men and women (Park & Krishnan, 1997).

Management (as defined by Robbins and Cenzo, 1995) is "the process of getting activities completed efficiently with and through people (p.4)." A manager is simply a person who directs the activities of other people within an organization. Managers are primarily concerned with efficiency effectiveness. Efficiency in getting the most for the least input and effectiveness in doing things correctly (Robbins & Cenzo, 1995).

Much modern management theory can be traced to the work of French industrialist Henri Fayol who proposed that all managers perform the functions of planning, organization, commanding, coordinating, and controlling (Fayol, 1949). These original functions have been condensed to the basic four components of planning, organizing, leading, and controlling (Robbins and Cenzo, 1995). Although leading is included in the basic four components, it is in reality comprised of mostly managerial functions (completing activities with and through people) like directing personnel, selecting proper communication channels, resolving conflict and motivating people to be productive in their job. The primary function of the four managerial functions is to accomplish organizational goals.

Buford and Bedeian (1988) identified five management functions of extension administrators, including planning, organizing, staffing and human resource management, leading and influencing, and controlling. Leadership as defined by Buford and Bedeian in this model is more closely related to management than to leadership. Their definition is, "Leading and influencing is the process of inducing individuals or groups (peers, subordinates, and non-subordinates) to assist willingly and harmoniously in accomplishing organizational objectives (p.6)." The "influencing and inducing" to fulfill organizational goals is not in line with participatory leadership discussed earlier.

Some of the leadership literature attempts to bring management into the leadership realm. Fleishman, 1953, Halpin and Winer, 1957, and Hemphill and Coons, 1957, believed that leader effectiveness can be determined by two dimensions, their level of consideration toward their subordinates and by their initiating structure. Level of consideration includes being supportive, friendly, listening to subordinates, and treating subordinates as equals. Initiating structure is the leader's ability to meet deadlines, criticize poor work, evaluate performance, and keep subordinates on-task. Seevers, Graham, Gamon, and Conklin (1997) stress that although a directive leadership (management) is appropriate at times, a flexible, participative leadership style is necessary for today's extension administrators.

In his review of leadership literature, Stogdill (1974), divided leadership characteristics into two distinct categories, task related characteristics and social characteristics. Task related characteristics included a desire for achievement, being goal driven, enterprising, and responsible. Social characteristics entailed the leaders ability to enlist cooperation from others, nurture followers, be socially successful, and use tact and diplomacy. Buford and Bedeian (1988) propose that all extension administrators are involved in management and non-management activities.

Bennis & Nanus (1985) coined the popular quote that "Managers do things right. Leaders do the right things." Although this quote helps us to begin to differentiate between management skills and leadership skills, it attempts to separate the two as if one person cannot perform in both capacities. The author would suggest that there are two distinct skill areas needed to administer or direct an organization. One skill area can be classified as management and the other leadership. Certainly there are times when the lines between the two are difficult to differentiate. Effective administrators move from one skill area to the other with relative ease.

There are literally thousands of books and scholarly articles written that address leadership and management. Although they are treated as separate entities, effective administrators learn to be effective in both realms. Unfortunately competent managers with a high level of leadership skills are in short supply (Toney & Brown, 1997).

Purpose and Objectives

The effective county extension director is both manager and leader. Much has been written about management in extension yet little attention has been directed toward the equally important concept of leadership among extension administrators. The purpose of this study was to assess the leadership styles of Florida's county extension directors with a 360-degree methodology using the Leadership Practices Inventory (LPI). The specific objectives of the study were to:

1. determine the overall Leadership Practices Inventory score of county extension directors as assessed by self-selected observers,
2. determine the overall Leadership Practices Inventory score of County Extension Directors through self-assessment and to
3. compare the County Extension Directors Leadership Practices Index self assessed scores with the Leadership Practices Inventory observer scores.

Methodology

A census of the 67 county extension directors (CEDs) in Florida was conducted in the fall of 1998 to assess the interest in completing this study. Fifty-one of the 67 (76%) county extension directors participated in the initial stage of this study (35 males and 16 females). Participation in the second phase of the study (fall 1999) dropped to 44 participants (66%) of the census population (28 males and 16 female).

The LPI designed by Posner and Kouzes was employed to assess the leadership styles of the participants. The initial phase of the study was conducted in the fall of 1998. Five observers were selected to evaluate the CEDs. They included their district extension director, another county director and three county agents or program assistants who worked with the county extension director on a regular basis. The county extension director selected the other CED and the agents or program assistants to evaluate their leadership style. This 360-degree method of analyzing leadership style has proven to be an effective way for leaders to gain a perspective of their leadership from those effected by it.

The second phase of the study was a self-assessment of leadership skills by the CEDs. This phase was conducted on the University of Florida campus in the spring of 1999. Forty-four CEDs participated in both stages of the project (66% of all Florida CEDs).

The LPI is the result of over 15 years of research in human leadership development conducted by the authors. At this time the researchers have evaluated over 12,000 individual leaders and have collected data from over 70,000 individual observers of leaders. Seevers et.al (1997) recognize the leadership practices measured by the LPI as necessary skills for extension administrators.

Kouzes and Posner began their look at leadership through conducting interviews with corporate leaders in the United States. Their initial sample of 1200 managers in middle to senior level positions represented a wide variety of public and private organizations and industries. From the initial research, five leadership practices were identified. They include challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart.

Leaders who are not bound by the status quo utilize the practice of challenging the process. These leaders are always looking for innovation and are not afraid to take risks in the organization. Leaders who display this trait know that failure is inevitable and approach failures as necessary learning experiences.

Leaders who inspire a shared vision are helping make the organization a reflection of the whole instead of an ideal of the leader. This practice includes an ability to see what can be while enlisting the creative energy of others to form the organization. Leaders who excel here are quiet persuaders and create a followership toward a common goal through their magnetism.

Enabling leaders give away power to their constituents so they can perform at their highest potential. Enablers foster collaboration and build teams in the organization. Leaders who enable others build trust in the organization and develop individual strengths to help others contribute to the organization.

Modeling the way includes following the same rules and guidelines set forth for everyone in the organization. Beyond that, leaders who model the way are continually setting the high standard for organizational performance by practicing what they espouse. Those who model the way help others through bureaucratic stumbling blocks and help others see their progress toward bigger goals. When people are working hard to accomplish the organizations goals, leaders who encourage the heart will be able to get their constituents to put in the extra effort for success. Leaders who encourage the heart are never afraid to offer thanks or congratulations. They recognize individual contributions and celebrate organizational wins. Leaders who encourage the heart make everyone feel as if they are highly valued.

Each leadership practice had a set of two strategies. The strategies include searching for opportunities and experimenting and taking risks (challenging the process), envisioning the future and enlisting others (inspiring a shared vision), fostering collaboration and strengthening others (enabling others to act), setting the example and achieving small wins (modeling the way), and recognizing individual contributions and celebrating team accomplishments (encouraging the heart). These practices and strategies accounted for over 70% of the behaviors described in the leader interviews conducted by Kouzes and Posner.

The LPI is a set of 30 statements that describe leadership behaviors. The observer is asked to rate the leader on a 10 point Likert scale from almost always displaying the leader behavior to almost never displaying the behavior. Each of the five leadership practice has six behavioral statements associated with it. Allowing 10 points per question with six questions per practice (60 points maximum for each practice and 300 points total for the instrument scores).

Percentile rankings compiled for the LPI were used to provide a baseline of comparison for county cooperative extension directors. The instrument developers consider scores falling below the 30th percentile to indicate a low propensity to perform a particular practice while a score above the 70th percentile would indicate a high disposition toward exhibiting the practice. Scores in between the 30th and 70th percentile are considered moderate.

All of the LPI practice constructs have an internal validity above .80. The test / retest reliability of the LPI is over .90 for each of the leadership practice constructs. The face validity of the instrument was established through the research process in identifying the constructs to be measured. The instrument developers matched the practices with behaviors that reflect the practices to develop the instrument. Factor analysis was utilized to validate the statements associated with the leadership practices.

Instruments were sent directly to the evaluators. The researcher used the Dillman Total Design Method for mail surveys (Dillman, 1978) to collect data. The overall evaluator response rate for the observers of the 51 CEDs was 92% (235 out of 255).

Findings

Objective 1 - Determine the overall Leadership Practices Inventory score of county extension directors as assessed by self-selected observers

The county extension directors mean scores for the five LPI leadership practices, were at or above the 50th percentile. The total mean score was 233.7 (SD = 25.9). Practice scores were in ranged from the 50th to the 60th percentile nationally. The practice of challenging the process had a mean score of 44.63 which placed it in the 50th percentile, while the practice of modeling the way rated at the 60th percentile nationally with a mean score of 48.71. See Table 1 for more information.

Do female and male county extension directors employ the same or different levels of the LPI leadership practices? Mean scores from the observers for men and women were significantly different ($\alpha<.05$ apriori) in all practices with the exception of modeling the way.

Table 1
Leadership Practices Inventory Observer Scores and National Percentile Rankings (N=51)

Practice	Mean Score (SD)	National Percentile
Challenging the process	44.63 (6.81)	50th
Inspiring a shared vision	43.47 (6.58)	53rd
Enabling others	50.01 (4.12)	55th
Modeling the way	48.71 (5.51)	60th
Encouraging others	46.75 (5.83)	52nd

The overall score for the LPI was significantly different for men and women ($\alpha = .01$) with men scoring an average of 227.55 (SD = 25.71) and women scoring an average of 246.72 (SD = 19.96) See Table 2 for details. A total of 300 points are possible on the LPI.

Table 2
Gender Comparisons of Observers Leadership Practices Inventory Practices and Total Score (N=51)

Practice	Female mean (SD)	Male mean (SD)	Significance
Challenging the process	47.78 (5.09)	43.10 (7.07)	.01
Inspiring a shared vision	46.93 (4.61)	41.89 (6.79)	.00
Enabling others	51.96 (3.44)	49.11 (4.14)	.02
Modeling the way	50.31 (5.21)	47.98 (5.55)	.16
Encouraging others	49.73 (4.70)	45.38 (5.84)	.01
Total score	246.72 (19.96)	227.55 (25.71)	.01

The women and men's leadership practices scores were compared to the national percentile rankings for comparison. The women were consistent in their scores with percentile rankings ranging from a low of 67th percentile for encouraging others to a high of 70th percentile for enabling others. The men had a wider range of scores from the 35th percentile for encouraging others to the 52nd percentile for modeling the way (Table 3).

Objective 2 Determine the overall Leadership Practices Inventory score of County Extension Directors through self-assessment

The County Extension Directors self assessment percentiles for the leadership practices ranged from a low of 52nd percentile for modeling the way to a high of 63rd percentile for enabling others. The three remaining practices were in the 50th – 60th percentile range (challenging the process 58th, inspiring a shared vision 55th, encouraging others 53rd).

Table 3
Observer Reported National Percentile Rankings by Gender (N=51)

Practice	Female Percentile	Male Percentile
Challenging the process	69th	41st
Inspiring a shared vision	68th	46th
Enabling others	70th	47th
Modeling the way	69th	52nd
Encouraging others	67th	35th

Table 4
Self Reported National Percentile Rankings by Gender (N=44)

Practice	Female Percentile	Male Percentile
Challenging the process	64th	58th
Inspiring a shared vision	55th	58th
Enabling others	70th	63rd
Modeling the way	62nd	57th
Encouraging others	56th	54th

The self reported scores for women were higher in four of the five practices and the total score than were the self- reported scores for men (Table 5). Men and women County Extension Directors were very close in their self assessment of leadership practices.

Table 5

Self Reported Leadership Practices Inventory Scores for County Extension Directors (N=44)

Practice	Female mean (SD)	Male mean (SD)	All CEDs
Challenging the process	47.1 (6.1)	46.1 (6.2)	46.5 (6.1)
Inspiring a shared vision	44.3 (6.8)	44.7 (7.7)	44.5 (7.3)
Enabling others	52.1 (4.3)	51.2 (4.3)	51.8 (4.3)
Modeling the way	49.1 (6.1)	48.6 (5.9)	48.8 (5.9)
Encouraging others	47.6 (7.2)	47.3 (7.0)	47.4 (7.0)
Total score	240.1 (22.5)	238.4 (26.9)	234.5 (25.1)

Objective 3 Compare the County Extension Directors Leadership Practices Index self assessed scores with the Leadership Practices Inventory observer scores.

In order to accomplish objective three, the researcher conducted two-tailed t-tests comparing overall, male, and female observer LPI scores to self-reported LPI scores. Self-reported mean scores for the total group of County Extension Directors were higher than the observer scores in every construct. Although the differences were not significant in most cases, the "enabling others" practice was significantly different between observers and self-reported scores. See Table 6 for details.

Table 6

Difference between LPI Observer and Self-Reported Scores for all CEDs (N=44)

Practice	Observer Mean (SD)	Self-Reported Mean (SD)	Significance
Challenging the process	44.7 (7.0)	46.5 (6.1)	.10
Inspiring a shared vision	43.6 (6.5)	44.5 (7.3)	.27
Enabling others	49.8 (4.2)	51.8 (4.3)	.01
Modeling the way	48.6 (5.6)	48.8 (5.9)	.45
Encouraging others	47.0 (5.9)	47.4 (7.0)	.36
Total score	233.7 (25.9)	239.0 (25.1)	.16

The male CEDs consistently ranked themselves higher than did their observers in all LPI constructs. The difference between self-reported and observer scores for men was significantly different in the constructs of challenging the process and enabling others. There was a statistically significant difference between the observers of the male CEDs and the CEDs themselves in two practices – challenging the process and enabling others (Table 7).

Table 7
Difference between LPI Observer and Self-Reported Scores for Male CEDs (N=28)

Practice	Observer Mean (SD)	Self-Reported Mean (SD)	Significance
Challenging the process	42.9 (7.4)	46.1 (6.2)	.05
Inspiring a shared vision	41.7 (6.7)	44.7 (7.7)	.08
Enabling others	48.6 (4.2)	51.7 (4.4)	.01
Modeling the way	47.7 (5.7)	48.6 (5.9)	.28
Encouraging others	45.3 (6.0)	47.3 (7.0)	.13
Total score	226.2 (26.2)	238.4 (26.9)	.06

Female CEDs were more critical of themselves than their observers, consistently scoring lower on the self assessment. The female CEDs rated themselves the same as the observers on one practice – enabling others (Table 8).

Table 8
Difference between LPI Observer and Self-Reported Scores for Female CEDs (N=16)

Practice	Observer Mean (SD)	Self-Reported Mean (SD)	Significance
Challenging the process	47.8 (5.1)	47.1 (6.1)	.31
Inspiring a shared vision	46.9 (4.6)	44.3 (6.8)	.09
Enabling others	52.0 (3.4)	52.1 (4.3)	.43
Modeling the way	50.3 (5.2)	49.1 (6.1)	.22
Encouraging others	49.7 (4.7)	47.6 (7.2)	.06
Total score	246.7 (20.0)	240.1 (22.5)	.12

Conclusions/Implications/Recommendations

This study assessed the leadership skills of county extension directors in Florida based on the Kouzes - Posner Leadership Practices Inventory (LPI) from the viewpoint of independent observers and by the County Extension Directors themselves. The Kouzes - Posner model of leadership consists of five practices identified through extensive research with leaders in business, industry, and public service. The five practices are challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart.

As a whole, observers ranked the Florida county Extension Directors from the 50th to the 60th percentile for all of the LPI leadership practices. Observers considered the CEDs were most proficient at modeling the way for their supervisors, co-workers and subordinates. Their lowest observer score was in the practice of challenging the process. Although these scores are in the moderate range of performance for the LPI leadership practices, there is room for improvement. As a result of the observer data, the CEDs were offered professional development opportunities in the spring of 2000 to help them to develop each of these leadership skills to complement their management skills.

When comparing observer scores of males and females, it is apparent that major differences in leadership practices exist. In fact, there is a statistically significant difference between men and women in four of the five leadership practices! The women had a tight range in their national percentile rankings (from the 67th to the 70th percentile) while the men were much lower, placing below the 50th percentile in all but one practice (modeling the way). Why do these differences exist? What specific actions or activities do the women practice that place them significantly higher than the men in the eyes of their supervisors, co-workers, and subordinates? More research is warranted to explore these gender differences in leadership practices.

The CEDs ranked themselves higher than did the observers in four of the five leadership practices. Female CEDs ranked themselves lower in four of the five practices, with one practice score, enabling others being the same for observers and self- reported scores. The male CEDs ranked themselves higher in every practice than did the observers.

The female CEDs did have a healthy view of their leadership practices although their perception of performance was lower that their constituents. On the other hand, the male CEDs perceived they were better leaders than their constituents would judge. Why does this discrepancy between genders exist? The researcher recommends a deeper examination of this finding to better understand this phenomena.

More information about the county extension directors is needed to build on the findings of this study. Does age, education, geographic location, time in the position, management skill, mentorship, leadership training and experience, or programmatic specialization influence leadership practices? More study is needed to understand the impact of leadership practices on extension administrator performance.

Extension administration involves a mix of management and leadership skills. Much effort is expended in developing extension administrators' management skills while little attention is given to the equally important set of leadership skills necessary for effective administration.

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Leadership Styles of Florida's County Extension Directors: Perceptions of Self and Others

A Critique

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The author has transcended the debate about the differences between management and leadership and moved the reader to consider leader behaviors of county extension directors. His use of an established instrument (Leadership Practices Inventory developed by Kouzes and Posner) allows him to extend comparisons beyond the sample to a national data base, and strengthens the implications of the study. Some of the results stimulate thought about the leadership change capacity of Cooperative Extension directors and the influence of gender on leader practices.

The lowest of the LPI practices reported by the observers was "challenge the process." At a time when Cooperative Extension is being encouraged to change, the relatively low national percentile ranking in "challenging the process" would indicate Cooperative Extension directors in this study may not have the leadership capacity to be catalysts of change. Perhaps over the years the traditional hierarchy of Cooperative Extension has not allowed reward for those who challenge established processes, and, therefore, this leadership practice is not exhibited to the fullest extent.

Observer scores on the five practices (challenging the process; inspiring a shared vision; enabling others; modeling the way; and encouraging others) indicate female county extension directors are believed to practice leadership behaviors at a significantly higher level than males. If the respondent demographics are representative of total director demographics, males outnumber females two to one in Florida Cooperative Extension director positions.

Why are female and male directors not equally represented? It could be that females have not aspired to director positions, but according to these results, it certainly isn't that they are less capable of leading. This also begs the question often asked when gender differences arise, must female leaders be stronger than male peers to be perceived as equally effective? The answer to this question involves a dimension not explored in this study, and that is perceived effectiveness. However, some would argue the LPI allows some opportunity for projection of total effectiveness. Without question, the gender leadership practice differences in this study merit further exploration, possibly through qualitative means.

In conclusion, the researcher is commended for using the results of this study as the basis for Cooperative Extension director training. He is encouraged to establish a longitudinal line of inquiry to determine if the training intervention affected the leadership practices as reported by the Cooperative Extension directors and their observers.

Involvement of Volunteers in Agricultural Education Programs in New Mexico

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Abstract

Enrollments in secondary agricultural education programs in New Mexico has steadily increased over the past several years placing more demands on the program and its resources. A common approach in education is to enlist volunteers to provide assistance and extend resources. The purpose of this descriptive study was to investigate agriculture education teachers attitudes towards volunteers, the perceived benefits and limitations of involving volunteers and the types of roles volunteers were engaged in. The population of this study was a census of all secondary and middle school agricultural education teachers in New Mexico during the Fall of 1999 (N = 90). A five part instrument developed by the researchers was used to collect data. Agriculture education teachers strongly believed that involving volunteers in their programs allowed them to focus on other parts of their programs and that volunteers were an essential component to a successful agricultural education program. Eighty seven percent of the agriculture education teachers reported using volunteers in their program. Roles most commonly assumed by volunteers included: chaperones, guest speaker in class/lab, coaching CDE events, and assisting with various FFA activities. Of the 13% of the teachers who did not involve volunteers, the majority indicated that it was because they were new to the program, the program was too small, or it involved too much time to properly supervise volunteers. Benefits of involving volunteers that were reported include: expanding the area of expertise and knowledge available to students, adding diversity and variety to the program, assisting with activities, and freeing the teacher to do other activities or work. Limitations cited were time needed to train and supervise volunteers, communication breakdowns, personality conflicts and lack of knowledge/expertise by the volunteer about the program, policies, discipline and/or subject area.

Introduction/Theoretical Framework

Agricultural education programs in New Mexico at the middle school and secondary level have had a steady increase in enrollment since 1985 (New Mexico State FFA Office, 2000). This parallels the national FFA membership numbers, which also have been, for the most part, steadily increasing since 1990. While larger enrollments are desirable and indicate that programs are thriving they also place increasing demands on programs and staff. In order to fully meet students' needs and ensure that programs are as effective as possible, educators must continually look for ways to enhance and strengthen their educational programs. At the same time, they also must strive to keep teacher workloads manageable with the increased demands on time and resources. In addition, programs face challenges from rapidly advancing technology, the knowledge explosion, increasing costs, and changing demographics (Ohio Department of Education, 1988).

One approach to handling larger enrollments is to hire an additional agricultural education instructor. In many cases, sheer numbers of students necessitate additional faculty. An additional instructor also allows a program to increase course offerings. Another way to deal with increasing enrollments is to look for volunteers from the community.

Enlisting the aid of volunteers is nothing new. Every year, millions of Americans volunteer their time and assistance to causes that they consider worthwhile (Katz, 1982; Ohio Department of Education, 1988). Kongshem (1996) states there is a resurgence in volunteerism throughout the country. The use of volunteers in the school setting provides an extra resource without adding additional costs to school budgets (Shifflett, 1994). Further, volunteers in the classroom and in other programs provide widespread benefits to students. Shifflett (1994) states that academic achievement appears to increase when volunteers are used. Programs can be expanded to better meet students' needs when volunteers and their expertise are employed. Parent volunteers for technology-related classroom and administrative tasks are beneficial for students and teachers alike (Ohlrich, 1996). While volunteers cannot be expected to replace paid personnel, they can make a significant contribution to their work (Katz, 1983).

The National School Volunteer Program, founded in 1956 in New York, formulated a set of objectives for using volunteers in schools. The objectives included:

1. To relieve professional staff of nonteaching duties.
2. To provide needed services to individual children to supplement the work of the classroom teacher.
3. To enrich the experiences of children beyond what is available in school.
4. To build better understanding of school problems among citizens and to stimulate widespread citizen support for public education (Carter and Dapper, 1974, p.52).

However, according to Umscheid (1991),the number of volunteers successfully involved in a program depend on a staff with a positive attitude toward volunteers and their involvement as a way to extend the teachers' own efforts. Elliot and Suvedi (1990) also found that teachers' positive perceptions about volunteers and the extent of help that volunteers can provide were related to the extent that the teachers used volunteers in their programs and to the types of roles or jobs they were given.

Elliot and Suvedi (1990) also found that in agricultural education programs in Michigan, volunteers primarily served on advisory committees and assisted with field trips, SAE and leadership activities within FFA. This is consistent with findings from Dormody and Seevers (1995) showing that more than 90% of all secondary agricultural education programs nationally had an advisory committee. They further concluded that those programs with an FFA alumni affiliate provided significant support and resources to the agricultural education program.

Although volunteers are being used in agricultural education programs, Elliot and Suvedi (1990) recommended that more volunteers should be used to help with classroom instruction, laboratory instruction, field trips and conventions, FFA skills contests, guidance and counseling, and recruitment. Additionally, teachers should be encouraged to use volunteers more frequently and effectively.

Despite the belief that volunteer involvement should increase, there is still a question of how fully the potential is being realized. The lack of information about how to use volunteers in agricultural education effectively inhibits the expansion of volunteer involvement (Katz, 1983).

Umscheid (1991) identified the concern that Cooperative Extension Service agents do not use volunteers more effectively because they do not have confidence in their ability to delegate responsibilities to volunteers.

Limited studies have been conducted to identify how volunteers are used in agricultural education settings. More and more demands with fewer resources are being placed on agricultural educators. What is the role of volunteers in agricultural education?

Purpose and Objectives

The purpose of this study is to describe the use of volunteers in New Mexico's agricultural education programs. The specific objectives of this study were to describe the following:

1. New Mexico agricultural education teachers on the characteristics of age, gender, ethnicity, number of years teaching, size of school, number of teachers in the department, and number of students enrolled in the program.
2. The attitude of agricultural education teachers toward the use of volunteers in agricultural education.
3. The types of roles volunteers in New Mexico agricultural education programs assume.
4. The degree of helpfulness exhibited by volunteers as perceived by agricultural education teachers.
5. The perceived benefits and limitations of using volunteers in agricultural education programs.

Methods/Procedures

The population for this descriptive study was a census of all secondary and middle school agricultural education teachers in New Mexico during Fall 1999 (N = 90). The most current list of teachers was obtained from the State Department of Education, Agricultural Education Office. For purposes of this study a volunteer was defined as any person who gave freely of their time, expertise or resources to assist the agricultural education program.

An instrument, developed by the researchers, contained five sections. The instrument was assessed for face and content validity by a panel of experts consisting of four teacher educators, the state supervisor of agricultural education, and the state executive FFA secretary. Section one included 16 statements to assess agricultural educators' attitudes towards volunteer involvement in their programs. Both positive and negative statements were included. A five point Likert scale (1 = Strongly Agree, 5 = Strongly Disagree) was used. Section two determined if volunteers were used in the program. To determine roles of volunteers, educators were asked to respond to a list of 14 possible activities. For each activity listed, they were to indicate the approximate number of volunteers used during the 1998-99 year. In addition, they were asked to estimate the approximate number of combined hours donated by the volunteers for the same year. An "other" category was provided for educators to write in an activity not appearing on the list. Types of roles ranged from chaperoning events to assisting with classroom instruction. Section three assessed degree of perceived helpfulness of volunteers involved in the program.

Respondents rated volunteer involvement in 14 different activities on a five point Likert-scale (5 = Very Helpful, and 1 = Not Helpful). An "other" category was available to write in a volunteer activity not included on the list. Also a "not applicable" category was provided if no volunteers were used by the educators in a particular activity. Section four included three open-ended questions related to the perceived benefits and limitations of using volunteers in agricultural education programs. The final section of the instrument included categorical and open-ended questions to obtain demographic information about the educators and their programs. Reliability of sections one and three was assessed using a pilot test procedure with 15 secondary agricultural educators randomly selected from Texas and Arizona. Section one yielded a Cronbach's alpha coefficient of .86. Section two had a Cronbach's alpha coefficient of .87.

Data were collected from November1999 through January 2000, following the Dillman (1978) procedure for mail questionnaire administration. Three mailings were conducted to maximize response rate. A final usable response rate of 77 % (n = 69) was obtained. Nonresponse bias was controlled by comparing early to late respondents. No significant differences were found between the groups allowing generalizability of the results to the total population (Miller & Smith, 1983). Objectives were analyzed using frequencies, means, standard deviations, and percentages.

Results/Findings

Objective One

The majority of the respondents were male (77.6%) and were in the 26 - 35 age range (41.2%). Eighty-two percent of the respondents were Caucasian and 12 % were Hispanic. Respondents have been teaching from one to 31 years with the highest frequency of respondents teaching only one or two years (21.7%). Sixty-four percent of those responding were the sole teacher in their program. Twenty six percent (n= 18) worked in two teacher programs. The number of students enrolled in individual secondary agricultural programs varied from eight students to 565 students.

Objective Two

Table 1 provides frequencies, means, and standard deviations of 15 statements indicating an attitude of secondary agricultural educators toward use and involvement of volunteers in their program. It was assumed by the researchers that the individual items in Table 1 contribute toward the overall domain of attitude towards the use of volunteers. Consequently, a summated mean is also reported. Attitude was measured using an anchored Likert scale with the following categories: 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, and 5 = Strongly Disagree. Negatively stated items were recoded.

Table 1

Attitudes Toward Use and Involvement of Volunteers in Secondary Agricultural Education Programs. (N = 68)

	Percent						
	SA	A	U	D	SD		
	%	%	%	%	%	Mean	SD
My administration supports the use of volunteers in school settings.	36.8	57.4	4.4	1.5	0.0	1.70	.62
Administrative support is essential for successful utilization of volunteers in schools.	25.4	58.2	9.0	7.5	0.0	1.98	.80
Using volunteers in my program allows me to focus on different aspects of the program.	13.2	61.8	17.6	7.4	0.0	2.19	.75
The benefits of involving volunteers outweighs additional expenses to my program.	16.2	51.5	25.0	7.4	0.0	2.23	.81
Volunteers make my job easier.	14.7	48.5	22.1	14.7	0.0	2.36	.91
Volunteers should be involved in the educational part of the program as well as the activities.	5.9	57.4	22.1	13.2	1.5	2.47	.85
Volunteers are good teachers.	8.8	51.5	22.1	14.7	2.9	2.51	.95
Supervising volunteers takes too much time.	4.4	51.5	29.4	13.2	1.5	2.55	.83
Agricultural education programs need volunteers to be effective.	7.4	52.9	16.2	22.1	1.5	2.57	.96
Using volunteers adds additional expenses to my program.	5.9	52.9	19.1	17.6	4.4	2.61	.99
My program depends on the support of volunteers.	8.8	47.1	17.6	22.1	4.4	2.66	1.05

Table 1 continued

Volunteers require too much supervision.	2.9	42.6	33.8	19.1	1.5	2.73	.85
It is easier to do things myself than train a volunteer.	2.0	36.8	25.0	29.4	5.0	2.98	1.01
Volunteers can take on almost any aspect of the agricultural education program with the right supervision.	2.9	38.2	23.5	25.0	10.3	3.01	1.08
Volunteers are a necessary nuisance.	0.0	13.4	20.9	58.2	7.5	3.59	.81
There are some roles volunteers should not assume.	0.0	0.0	0.0	39.7	60.3	4.60	.49

Summated Mean = 2.67   1 = Strongly Agree; 5 = Strongly Disagree

Overall, agricultural educators indicated a positive attitude toward involvement of volunteers in their programs. Educators strongly believed that involving volunteers in their programs allowed them to focus on other aspects of their program and that agricultural education programs need volunteers to be effective. Although there was agreement that using volunteers adds additional expenses to the program, it also was strongly supported that the benefits of involving volunteers outweighed those additional expenses. Educators also agreed that administrative support for using volunteers in the program is essential. While most educators supported the value that volunteers add to their program, there also was agreement that supervision of volunteers takes too much time. The summated mean for assessing agriculture educators attitudes toward use and involvement in secondary agricultural education programs was 2.67.

Objective 3

The majority (87%) of the agricultural educators in New Mexico were using volunteers in their agricultural education programs. Table 2 indicates that teachers reported using volunteers most frequently as chaperones; guest speaker in a class/lab; coaching CDE events; and assisting with various FFA activities, such as contests, fairs, etc. This is consistent with findings from Elliot & Suvedi (1990). Only 58% of the teachers that reported using volunteers indicated their involvement on advisory committees. Dormody and Seevers (1995) reported a much higher involvement of advisory committees nationally. Volunteers were least involved in assisting with office operations, recruiting students, and marketing the program. The highest number of volunteers statewide were involved assisting with FFA activities (n = 387), fundraising (n = 360), and serving on advisory committees (n = 318). Volunteer activities with the fewest number of volunteers engaged were assisting with office operations (n = 9), SAEP projects (n = 62), and recruiting new students (n = 64). The average number of hours contributed by volunteers varied greatly according to activity. Activities requiring a longer duration, such as chaperoning or assisting with FFA activities at fairs or contests involved more volunteer hours than serving as a guest speaker in a classroom or lab.

Table 2
Roles of Volunteers in New Mexico Agricultural Education Programs

Activity	% of teachers using volunteers	# of volunteers		Avg. # of volunteer hours
		N	Mean contributed	
Classroom instruction	40.6	79	2.8	28.5
Laboratory instruction	44.9	101	2.6	27.8
Advisory committees/board	58.0	318	7.0	29.4
Guest speaker in lab/class	71.0	154	2.3	7.7
Field trip coordinator/host	50.7	107	2.3	8.6
Coaching CDE events	68.1	155	2.3	61.0
Chaperoning conferences, etc.	75.4	206	3.3	108.1
Fund raising	50.7	360	10.5	105.8
SAEP (other than parent/guardian)	24.6	62	3.4	54.1
Assisting with FFA activities (contests, judgings, fairs, etc.)	62.3	387	10.7	107.5
Assisting with office operations	5.8	9	1.0	33.5
Marketing the program	18.8	88	5.7	43.4
Recruiting	15.9	64	5.6	27.5
Evaluating the Program	30.4	127	8.1	12.1

Table 3
Perceived Helpfulness of Volunteer Involvement by Activity

		Percent							
		5	4	3	2	1	NA		
Activity	N	%	%	%	%	%	%	Mean	SD
Assist with office operation	57	5.3	7.0	7.0	5.3	10.9	64.9	4.85	1.78
Chaperoning	59	62.7	18.6	5.1	1.7	0.0	11.9	4.77	.78
Marketing the program	56	10.7	14.3	12.5	5.4	5.4	51.8	4.75	1.57
Recruiting	55	10.9	7.3	14.5	10.9	3.6	52.7	4.69	1.64
Fund raising	59	39.0	22.0	8.5	3.4	3.4	23.7	4.61	1.23
SAEP (other than parent/guardian)	56	16.1	16.1	19.6	7.1	1.8	39.3	4.55	1.45
Advisory committee	59	39.0	22.0	16.0	0.0	3.4	18.6	4.49	1.17
Laboratory instruction	58	20.7	29.3	13.8	1.7	5.2	29.3	4.46	1.36
Coaching CDE events	58	53.4	20.7	6.9	5.2	3.4	10.3	4.46	1.15
Evaluating the program	56	10.7	21.4	21.4	7.1	1.8	37.5	4.44	1.45
Assisting w/FFA activities (contents, fairs, judgings)	57	50.9	31.6	7.0	5.3	0.0	5.3	4.43	.90
Classroom instruction	59	11.9	27.1	15.3	3.4	8.5	33.9	4.32	1.56
Guest speaker in class/lab	60	40.0	38.3	10.0	5.0	1.7	5.0	4.25	1.00
Field trip coordinator/host	58	15.5	32.8	22.4	3.4	5.2	20.7	4.12	1.35

Note: 5 = Very Helpful; 1 = Not Helpful; NA = Not Applicable
Summated Mean = 4.54; SD = 1.34

Objective 4

Of the 87% of the agricultural educators that indicated they used volunteers in their programs, the overall degree of perceived helpfulness was very high. Perceived helpfulness of volunteers was measured using a 5 point Likert scale where 5 = Very Helpful and 1 = Not Helpful. A not applicable (NA) category also was included. The mean score for all 14 activities was rated 4.1 or higher with a summated mean of 4.52 and a corresponding standard deviation of

1.34.

Objective 5

Responding to an open-ended question format, teachers were asked to indicate their perceived benefits and limitations to using volunteers in agricultural education. Although, 58 separate benefits were identified, and several common themes emerged. Many respondents indicated that use of volunteers was a way to broaden the area of expertise and knowledge available to students. One teacher stated, "Agricultural educators have some favorite or specialized areas and do need help in other areas in order to get all students educated to the fullest." Other benefits identified included adding diversity and variety to the program; assisting with fund raising, chaperoning and activities; freeing the teacher to do other activities or work with other students; and providing more opportunities for students. Many teachers indicated that a major benefit was increased community involvement and participation. "Involvement by members of the community increases 'buy in' for program success. Volunteers bridge the school and community gap, which helps the school program in teacher/parent/administration interactions."

Limitations of involving volunteers also varied. Of concern was the time needed to properly train and orient volunteers One teacher was quoted, "training volunteers in classroom and lab management as well as ensuring you have picked the right person for the right job, takes too much time." Other barriers identified include personality and power conflicts, poor communication , and lack of knowledge/expertise by the volunteer about the program, policies, student discipline, and/or subject area.

Conclusions/Recommendations/Implications

Agricultural education teachers in New Mexico exhibited a positive attitude toward involvement of volunteers in their program. There was agreement that volunteers are an important part of the agricultural education program, that use of volunteers provides many benefits, and involving qualified volunteers in various functions and activities frees the teacher to focus on other aspects of the program. Overall, it was believed that volunteer involvement in the program made the teachers' job easier. Of the 13% of teachers that did not use volunteers in their program, the majority indicated that it was because they were new to the program, the program was too small, or they did not have the time to properly supervise volunteers

State and national statistics indicate that not only is enrollment in agricultural education programs growing but the availability of qualified teachers is shrinking. Involving community volunteers is essential to maximize resources and meet needs. Teachers must look to the community and actively engage them.

Not only did teachers believe that volunteers were essential to their program, there was strong agreement that volunteers should be involved in educational aspects of the program as well as support efforts. Elliot and Suvedi (1990) found that volunteers in Michigan agricultural education programs served primarily on advisory committees and assisted with field trips and FFA activities. This also is consistent with findings by Dormody and Seevers (1995). Volunteers in New Mexico were active in support activities such as chaperoning, fund raising, and assisting with FFA activities, but they also were involved in educational activities such as laboratory and classroom instruction, serving as a guest speaker in class/lab, and coaching CDE events. New Mexico agricultural educators stated that volunteers not only add a wealth of knowledge and experience to program but also bring a variety of viewpoints to the educational arena.

Involving volunteers with special skills and expertise is a way to broaden the knowledge base available to students and allow teachers to focus on other areas. Volunteers with backgrounds and expertise in a variety of topics are available and willing in every community. The volunteer experience will be most successful, however, when the agricultural educator determines specifically what his/her needs are, matches the individual with the need, and provides clear and specific guidance about roles, responsibilities and needs. Agricultural educators in New Mexico rated the helpfulness provided by volunteers in their programs as very high, clearly indicating with proper planning and coordination that volunteers can be an asset to the program.

Successful use of volunteers requires some degree of supervision. Findings indicate that while volunteers are perceived to be a positive resource to the program, supervision of volunteers takes too much time. In-service training for teachers on strategies for recruiting, supervising and coordinating volunteers could strengthen the program and greatly minimize or eliminate some of the barriers or limitations described. Opportunities for in-service training and support in volunteer management should be made available to teachers through appropriate sources, such as teacher conferences, workshops, credit options, and newsletters. Incentives to motivate and encourage educators should be provided and teachers successfully using volunteers should be recognized and rewarded.

Clear communication about needs and expectations is essential. Teachers are encouraged to develop a volunteer handbook that outlines policies, procedures, expectations, and guidelines for using volunteers in their programs. Although time and effort will be necessary at first to develop a comprehensive handbook, it can be used repeatedly as needed with only minor revisions or updates. An orientation meeting with volunteers at the beginning of each school year or prior to an activity or event should be conducted to clearly communicate expectations. Copies of selected materials in the handbook, such as school policies or discipline procedures, should be duplicated and provided to volunteers at the orientation meeting.

Agricultural education teachers in New Mexico clearly indicated that administrative support is essential for successful use of volunteers in schools. Security and issues of safety have become prime concerns for almost every school district. As such, individuals on school grounds without approval or authorization are considered to be a potential threat. The safety and well-being of students must be paramount to all involved. Consequently, it is essential for administrators to not only understand the uniqueness of agricultural education programs but also the vital role the community and its citizens have in contributing to it's overall success. Teachers need to discuss with administrators the roles and responsibilities volunteers will be assuming. Whenever possible, a list of names and responsibilities of volunteers should be provided to the school office. Administrators are encouraged to visit the agricultural education program facilities to meet and observe volunteers involved in their school.

Volunteers are an invaluable community resource and should be involved whenever possible in agricultural education programs. Good communication, organization, and management of the volunteer program will establish a solid and beneficial partnership.

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Involvement of Volunteers in Agricultural Education Programs in New Mexico

A Critique

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At a time when society has a renewed commitment to volunteerism and high school agricultural educators are faced with increasing demands from numerous directions, this study offers much to consider. The researchers have executed a well-designed study that has its origin in a strong theoretical framework.

It is interesting to ponder whether differences in attitudes about volunteers were related to respondent demographics. Often times we collect demographics to understand who the respondents were, but stop short of determining if these demographics manifested themselves in differences in responses. For example, were there significant respondent differences according to years of teaching?

While the roles list is excellent, I would like to add one additional role, the one of program advocate. Volunteers who understand the worth of the agricultural education program have the opportunity to impact decision makers. Yes, volunteers who are alumni and advisory committees can fulfill a similar role, but volunteers as program advocates, who may not be involved in one of these committees, can be equally effective.

The researchers recommend in-service training for educators to strengthen their understanding of volunteer strategies. While this is an appropriate recommendation, I suggest pre-service education should involve a stronger emphasis on the value of volunteers to agricultural education programs, and ways to effectively train and manage them.

The study leaves one to ask another question, why do volunteers opt to become involved in agricultural education programs? Is it because they were in the agricultural education program during their youth, they have children involved in the program, they are interested in sharing their expertise? The list of possibilities is much longer than the one presented, but understanding why volunteers choose to participate could go along way to understanding how to effectively engage and retain volunteers.

Safety And Health Attitudes And Beliefs Of Entry-Year Agriculture Teachers In Texas

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Abstract

Creating healthy safety climates within the agricultural education programs is the responsibility of teachers managing these programs. This is of particular concern for entry-year teachers due in part to stress and time management anxiety. Administrators and teachers are legally recognized as standing in loco parentis to the students under their supervision. Thus, the necessity for agriculture teachers to exhibit safe practices and behaviors thus creating a positive safety climate, is important to reduce future preventable injuries, not only while the student is in school, but also when they enter the workforce. The purpose of this descriptive study was to gather baseline data describing agricultural safety attitudes and perceptions of curricula used by Texas agriculture teachers with less than two years of teaching experience.

From a census of entry year Texas agriculture teachers (N=118), teachers' pre-service safety and health preparation and training were reviewed in addition to soliciting perspectives on available safety and health curricula, usage and practices. Responding teachers (n=74; 57 males, 17 females) were well distributed both by Texas FFA region and school enrollment.

Teachers agreed all shops should have a working fire extinguisher, and a clean and well-organized shop reflected a safe environment. To a lesser degree, teachers agreed that proper protective equipment should always be worn during agricultural work and having emergency phone numbers posted by the phone was beneficial but the majority did not have emergency phone numbers nor emergency directions posted in their homes. The majority of the teachers did not wear seatbelts when driving tractors, however most always made sure the PTO shields were in place.

Teachers began driving tractors and agricultural equipment at average age of 11.8 years, while they allowed students or children drive at an average age of 14.87 years old. Surprisingly, teachers indicated that children must be 11 years or older to help with working livestock.

When doing agricultural work, teachers utilized personal protective equipment, although not consistently overall with only one quarter always wearing appropriate protective equipment. Although a large majority sporadically used appropriate equipment, the limitedness in safety attitudes and safety climates are amplified in the school setting.

Teacher preparation programs should place a much larger emphasis on instilling and developing safety attitudes and skills with pre-service teachers. Workshops should be organized and offered on safety education including topics concerning modeling safety attitudes and actions. It was recommended that this study should be repeated annually and supported with similar research efforts identifying safety and health attitudes of all agriculture education teachers and the overall safety environment of agricultural education programs.

Introduction

The National Safety Council reported there were 24 deaths per 100,000 agricultural workers and 140,000 disabling farm-related injuries (National Safety Council, 1996). This situation presents a special challenge for career and technology education programs that are tied to dangerous occupations such as agricultural education is to agriculture. Healthy People 2000 (DHHS, 1990) suggested that ages 15 through 24 are a time when young people develop behaviors that may become permanent and that health and safety issues need to be clarified.

Under current civil law, administrators and teachers are recognized as standing in loco parentis to the students under their supervision. Thus, the necessity for agriculture teachers to model safe practices and behaviors and to create a positive safety climate, is important to reduce future preventable injuries, not only while the student is in school, but also when they enter the workforce. Based on the relationship between teacher carelessness and incidence of student injury, Lawver and Fraze (1995) recommended Texas agriscience teachers receive more pre-service and in-service education in the areas promoting positive safety attitudes and decreasing teacher carelessness.

Research addressing safety standards, safety attitudes and other concerns is presented in countless texts, journals and magazine articles. Safety concerns have been revealed across the country and illuminated most specifically by the following studies: Berkey, 1981 & 1989; Kigin, 1983; Gleim and Hard; Lawver, 1994; Schlautman and Silletto, 1992; Swan, 1993; Hubert, 1996; and Ullrich, 1997. Even with this volume of evidence that there are major safety concerns little if any research has been conducted upon the preparedness of these teachers to deal with emergency illnesses or injuries.

Students desiring employment in a hazardous occupation need proper safety instruction both for the present and the future. Such is the case with students preparing to enter into production agriculture and many of its support industries. Students in agricultural education programs commonly use equipment and devices, identical to that used in industry. Sullivan (1990) acknowledged vocational teachers are responsible for the safety of their students because of moral obligations and assigned duties for providing a safe environment for their students. It is also understood that preventable and unfortunate, accidents occasionally occur in classrooms, laboratories, during field experiences and while managing supervised agricultural experience programs. Consequently, Daniels (1980) concluded the most important responsibility of the agriculture instructor was to ensure safety of the students.

In 1989, Johnson found that eleven of the top 18 agricultural mechanics laboratory competencies were safety based. A Swan (1993) study recommended designating local and federal funds for use in improving safety and emergency equipment and instruction available to instructors and students. Furthermore, the development of a positive and continuous safety climate within an agricultural education program is directly influenced by the personal attitudes, beliefs and skills of the teachers managing that program.

If agricultural education programs are to prepare students for careers in agriculture the issue of acknowledging the dangers of this industry and reducing injuries and illnesses is paramount. A sense of urgency must be created to infuse a continuous positive safety climate in agricultural education programs. As such, a need has been established to determine the personal safety beliefs and attitudes of entry-year teachers in agricultural education.

Purpose / Objectives

The purpose of this descriptive study was to provide baseline data for the description of attitudes and perceptions of agricultural safety issues and curricula by Texas agriculture teachers with less than one and one-half years of teaching experience. Two objectives were developed to guide this study.

1. Describe selected characteristics of Texas agricultural science teachers with less than one and one-half years of teaching experience.
2. Determine personal beliefs and attitudes regarding common agricultural safety and health issues for Texas agricultural science teachers with less than one and one-half years of teaching experience.

Methods/Procedure

The target population was Texas agriculture teachers with one and one-half years of teaching experience. These teachers were selected from a database of over 1400 Texas Agricultural Science teachers. The Vocational Agricultural Teachers Association of Texas (VATAT) database of first year teachers served as the sampling frame, and 98 teachers were identified as meeting the selection criteria. Duplicates and foreign elements were removed. Missing elements were identified from university entry-year teacher lists and added which adjusted the sample to 118 identified teachers. A census of the target population was surveyed. The inferential population was considered to be all entry-year agriculture science teachers.

Descriptive research methodologies were employed to collect data. The instrument designed was a booklet style questionnaire. The instrument contained six sections: (I) demographics, (II) agricultural curricula and teaching materials, (III) classes taught 1998-99, (IV) personal health and safety training, (V) personal beliefs and (VI) personal practices. Teacher educators, and state agricultural education staff from Texas and Oklahoma served as a panel of experts to review the instrument for face and content validity. Appropriate revisions were completed based on comments. To insure reliability, the instrument was administered to several agricultural science teachers in southeast Texas. Following review and revision the instrument was distributed to the target population. To ascertain internal consistency, Cronbach's alphas for Sections IV (personal health and safety training), V (personal beliefs) and VI (personal practices) were calculated with results being .71, .62 and .57, respectively. The relatively low internal consistency for the personal practices may be because the items included statements that, while individually important as safety practices, may be unrelated to each other (e.g "I was when I first operated a tractor equipment alone") or due to the small number of items in this section.

Data were collected over an eight-week period during the spring of 1999. The instrument, cover letter, self-addressed, postage-paid envelopes and detailed instructions were mailed during first week of April 1999. After approximately two weeks, reminder postcards were sent to those failing to respond. Two weeks later a second survey was mailed. Non-respondents from both mailings were phoned. A final attempt to secure data on the target population was conducted via recruitment and curricula distribution booths at the 1999 Texas

FFA convention and VATAT Professional Improvement Conference.

Completed instruments were collected from 74 of the identified 118 agriculture teachers with one and one-half years of experience (63% response rate). Descriptive statistics, ANOVA, T-tests, and regression procedures were conducted and all results analyzed at the .05 level of significance. For the purpose of this study demographic, personal beliefs and personal practices data will be used to make recommendations concerning safety issues of entry-year teachers.

Findings

Of the 74 teachers meeting the entry year qualification 57 (77.03 %) were male and 17 (22.97 %) were female. This was a larger percentage of females than the overall rate (8.98%) for Texas agricultural science teachers. Combined mean age was 27.31 years. Teachers were placed into age groupings for the purpose data analyses. The groupings were a more traditional age group "20-25 years" (n=40) and a non-traditional age group of "26 years or greater" (n=32). Males were evenly distributed between the two groupings (29 and 28 respectively) while almost twice as many females were in the younger grouping (11 and 6 respectively).

Entry year teachers were well distributed throughout the state. The Vocational Agriculture Teachers Association of Texas follows the area associations established by the Texas FFA Association. The ten Texas Areas are illustrated in Figure 1.

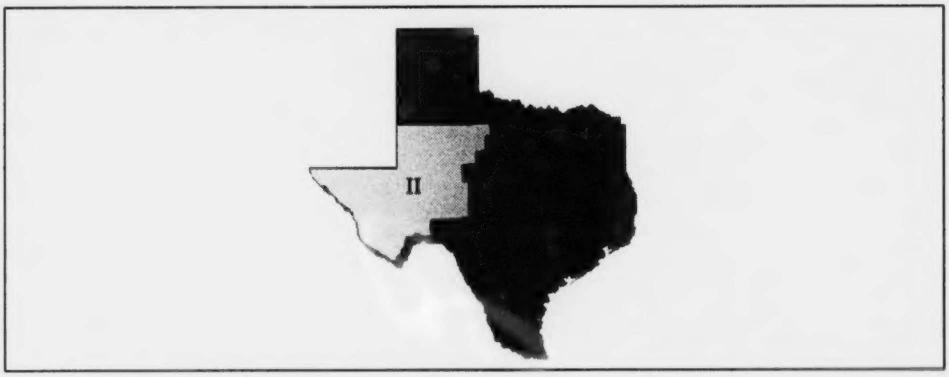

Figure 1. Texas Vocational Agriculture Teachers Association of Texas (VATAT) Areas

The largest numbers of entry year respondents by area were from Areas III (14, 18.92 %), IX (10, 13.51%), and X (8, 10.81%). The remaining seven Areas had between four (5.41%) and seven (9.46%) respondents per area. This indicated that these new teachers were reasonably distributed throughout the state. Table 1 provides the delineation of teachers by area.

To check the distribution of new teachers by school size, respondents were asked to identify the enrollment size of school by University Interscholastic League (UIL) conference.

Table 1. Texas Entry Year Teachers Distribution by Area.

	Area										
	I	II	III	IV	V	VI	VII	VIII	IX	X	N
Number of teachers	4	7	14	7	5	6	6	7	1	8	74

The divisions of Texas high schools for competitions for the 1998-99 school years were based on enrollment figures and are divided as follows: 5A—1,780 students or greater; 4A—780-1,779 students; 3A—345-779 students; 2A—160-344 students; and 1A—159 students or fewer (University Interscholastic League, 1999). The distribution of new teachers by UIL conference / school enrollment are presented in Table 2. Data indicated that on average there were 146.16 students enrolled in these agriculture education programs (range 16-625) of which 91.18 were FFA members (range 5 to 350).

Table 2. Teacher Distribution by UIL Conference / School Enrollment

	Conference Classification					
	1A	2A	3A	4A	5A	N
Number of teachers	15	15	19	13	10	72

Teachers were asked to give their opinions to a series of questions concerning their personal beliefs and attitudes regarding common agricultural safety and health issues. On a forced response four point Likert-type scale (1 = highly agree, 2 = agree, 3 = disagree and 4 = highly disagree) respondents were highly agreeable that all shops should have a properly working fire extinguisher (M=1.22), and that a clean well-organized shop reflects a safe working environment (M=1.25). Teachers also perceived that wearing proper protective equipment was very important (M=1.30), having emergency numbers posted by the phone were slightly less important (M=1.40), and that seatbelts should be worn and that safety devices in place when operating tractors and farm machinery (M=1.48). Respondents agreed that fences around farm ponds and stock tanks and lagoons are effective safety precautions (M=1.9). To a lesser degree teachers agreed (M=2.06) that mandatory age requirements should be established to operate tractors and / or equipment (Table 3).

Table 3. Texas Agriculture Teachers' Personal Beliefs and Attitudes.

	M	SD	N
All shops should have a properly working fire extinguisher.	1.22	.71	73
A clean and well-organized shop reflects a safe environment.	1.25	.59	73
Proper protective equipment should always be worn when doing agricultural work.	1.30	.73	73
Emergency numbers posted by the phone are a good idea.	1.40	.79	73
Seatbelts should be worn and safety devices in place when operating tractors and farm machinery.	1.48	.66	73
Fences around farm ponds / stock tanks and lagoons are an effective safety precaution.	1.90	.80	72
Mandatory age requirements should be established to operate tractors and / or equipment.	2.06	.73	73

Note: 1= highly agree, 2=agree, 3=disagree, 4=highly disagree

The answers to questions concerning personal safety practices of entry-year teachers are reported in Table 4 and are indicators of teacher attitudes about a positive safety climate. Considering the teachers that responded to the question asking if they wear a seatbelt when driving a tractor 22 or 34.92% indicated that they did while 65.08% did not. Eleven of the respondents indicated that the question was not applicable. An overwhelming majority (82.26%) indicated that they made sure that when they operated a tractor that the PTO shields were in place, 17.74% did not follow this basic safety precaution, while eight teachers identified that this question was not applicable. When asked if their home shop had a properly working and accessible fire extinguisher 69.39% stated that they did, 30.61% did not and twenty-four of the teachers did not have a home shop.

Two additional questions were asked to identify if the teachers were prepared for emergencies at their homes. Fifty-one (69.86%) of the 74 respondents stated that they did not have emergency phone numbers posted by all phones while 22 (30.14%) had phone numbers posted. Only ten (13.51%) of the teachers had directions to their home / property posted by phones for emergency use.

In Table 5, data on entry-year teachers age and opinions on age requirements are noted. The researchers were interested in determining the age of responding teachers when they first operated a tractor or piece of agricultural equipment alone. The average age was found to be 11.80 years, the range was from 21 years old to 47 years old with a standard deviation of 6.63. These teachers allow trained drivers with a mean age of 14.87 while they began driving tractors and farm machinery when they were 11.80 years old. Furthermore, teachers felt children should be 11.02 years old to assist when working with livestock.

Table 4. Personal Safety Practices of Entry-Year Texas Agriculture Teachers.

	Yes (%)	No (%)	N	N/A	N
When operating a tractor I wear a seatbelt.	22 (34.92%)	41 (65.08%)	63	11	74
When operating a tractor I make sure PTO shields are in place.	51 (82.26%)	11 (17.74%)	62	8	70
My shop at home has properly working and accessible fire extinguishers.	34 (69.39%)	15 (30.61%)	49	24	73
I have emergency phone numbers posted by all phones.	22 (30.14%)	51 (69.86%)	73	--	73
I have directions to our house / property posted by all phones for use in an emergency.	10 (13.51%)	64 (86.49%)	74	--	74

Table 5. Teacher Safety Information and Opinions on Age

	M	SD	N
How old were you when you first operated a tractor or equipment alone? *	11.80	6.63	73
I allow trained drivers age _____ and older to drive tractors and farm equipment alone. *	14.87	2.15	73
Children must be _____ years old to assist when working with livestock. *	11.02	3.30	73

*Mean is calculated as years of age.

Additional personal safety practices were evaluated. Respondents always wear appropriate protective equipment while working at a rate of 22.36% and almost always 68.42% of the time. Few teachers rarely (9.21%) and never (1.31%) wear protective equipment. Similarly, these teachers always or almost always followed recommended directions when mixing chemicals. This data is illustrated in Table 6.

Table 6. Personal Safety Practices of Teachers

	Always	Almost Always	Rarely	Never	M	SD	N
While doing agricultural work, I _____ wear the appropriate protective equipment. **	17 (22.36%)	52 (68.42%)	7 (9.21%)	1 (1.31%)	1.90	.60	70
I _____ follow recommended directions when mixing chemicals for application. **	60 (77.92)	17 (22.08%)	0 (0%)	0 (0%)	1.22	.42	77

**Note: 1=Always, 2=Almost Always, 3=Rarely and 4=Never

Conclusions

The demographic data revealed that females are entering the field of agricultural education in larger numbers than in the past. This data also indicated that teachers with less than one and one-half years of teaching experience are older than traditionally thought. The schools with teachers with less than one and one-half years of experience are spread quite evenly across the state indicating the scope of the state teacher shortage.

In general these teachers have strong personal safety beliefs and safety attitudes. When reviewing the data, nearly all highly agreed or agreed with the safety statements indicating that they have an excellent understanding of what is required in a well-defined safety climate.

It is also obvious that these same teachers who possess an excellent awareness of what is required to have a well-defined safety climate do not follow appropriate personal safety practices. Furthermore, it is interesting to note that these teachers do not always wear appropriate protective equipment when doing agricultural work nor when mixing chemicals. This is indicative of an attitude of "do like I say, not like I do." As role models for students in agricultural education programs this is an ethical dilemma that cannot be ignored. The researchers' concern is that the teachers seem to understand the safety concerns but do not follow the safety practices that will protect them from injury.

Basic safety issues such as wearing seatbelts when operating a tractor, posting emergency phone numbers and directions were largely ignored. To a lesser degree these teachers had an acceptable compliance of checking PTO shields when operating a tractor and of having fire extinguishers in their home shop facility. Yet again many of these teachers failed in their ethical and moral obligations by modeling improper safety attitudes and practices.

It is also noteworthy that these respondents recognize the dangers of allowing children to operate tractors and farm equipment. This is indicated by the differences in the age at which they first operated tractors and equipment, compared to the age at which they now allow children to be involved in the same activity.

Recommendations

Based upon the conclusions and major findings of the research, the following recommendations were made:

1. As a means of improving teachers' awareness of the importance of modeling proper safety attitudes and actions teacher preparation programs should place a much larger emphasis on instilling and enforcing these attitudes and skills on pre-service teachers.
2. Workshops should be organized and offered during the Professional Improvement Conference on safety education including topics concerning modeling safety attitudes and actions.
3. Although no significant differences were found when comparing gender and age groups within the various sections further research is necessary to address the unique concerns of females and older teachers with less than one and one-half years of experience.
4. This study should be repeated annually with similar research identifying safety and health attitudes of all agriculture education teachers and the overall safety environment of agricultural education programs.

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Safety And Health Attitudes And Beliefs Of Entry-Year Agriculture Teachers in Texas

A Critique

Kirk A. Swortzel
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Safety issues have been, and continue to be, of the utmost importance in agricultural education programs. Teaching students about safety issues affords teachers to provide instruction in the affective domain, the domain of learning in which the least amount of instruction typically occurs in our programs. Yet we know that to change one's attitude toward safety issues can be a monumental task. Therefore, agricultural education teachers must accept the responsibility to be a role model for students in promoting safe practices in agricultural education.

This paper is part of a larger study conducted by the authors to assess the knowledge, attitudes, and perceptions of agricultural education teachers regarding agricultural safety issues and curricula. This paper specifically addresses the attitudes and beliefs of agricultural education teachers regarding agricultural safety and health issues. The authors provide a solid background and theoretical framework for the study. I also commend the authors for having a clearly stated purpose and objectives for the study. Descriptive research methods were used to collect data for the study and appropriate analysis procedures were used.

The results of the study proved to be very interesting. It would appear that teachers were honest in their responses regarding safety and health issues. It would also appear that there were discrepancies regarding the information in Table 5. I would be curious to know what the ranges for all were to see how different the teachers thought about these questions.

My question would be to teachers who participated in the study, "If you know that you are not following proper safety procedures 100 percent of the time, then why do you not change your practices yourself?" After all, are teachers not role models for safe practices? If teachers are setting a poor example, then students will practice unsafe practices as well. It makes one wonder where these teachers learned about health and safety issues. I would hope some type of instruction was provided in their undergraduate program.

I encourage the authors to continue their research in this area, but would encourage them to look in other areas than agricultural mechanics or production agriculture, as somewhat indicated in the results. In agriscience programs today, there many more safety practices which must be followed. Agricultural education teachers will have to model these practices as well.

Safety And Health Education Analysis of Texas' First Year Agriculture Teachers

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Abstract

Agricultural education programs have responsibilities to prepare students for both further study within the field or provide opportunities to develop skills needed to support entry-level employment in one of the many sectors within the food and fiber systems industry. As with many physical labor positions employees must utilize safe workplace practices. These practices are often learned through pre-employment training, such as an agricultural education program. Studies have indicated agriculture teachers do not receive adequate training, feel comfortable with teaching safety, or maintain current teaching resources to sufficiently instruct their students in proper practices. The purpose of this study was to determine the general preparedness of Texas agriculture teachers regarding safety and health education in agriculture and their perceptions of teaching resources available for use in their classrooms.

Using a census of entry year Texas agriculture teachers (N=118), teachers' preservice safety and health preparation and training were reviewed in addition to soliciting perspectives on available safety and health curricula, usage and practices. Responding teachers (n=74; 57 males, 17 females) were well distributed throughout the state both by FFA region and school enrollment size. A majority of respondents indicated they taught safety within units of instruction rather than as separate, individual units. Teachers indicated a variety of teaching technologies available for classroom usage, however the most useful safety materials they utilized were videotapes with an accompanying study guide. There was also a preference for simulations and demonstrations and individual student booklets. Few indicated a strong usefulness for slides, transparencies or interactive media.

General safety and health training received during preservice education was lacking with these entry year teachers although greater than 50 percent of the teachers had been trained in cardiopulmonary resuscitation (CPR) and first aid (20 percent currently certified). Industry also imparted many teachers with additional safety and health training experience.

From a teaching resource perspective, an unexpectedly large percentage of teachers had computers with CD-ROMs and Internet access, as well as the traditional equipment in slide projectors, televisions and VCRs available. Even though teachers had access to modern computer technology, there was a common aversion for using interactive media or Internet as teaching tools.

It was recommended that agriculture teacher education programs address the under representation of training regarding safety and health education and improve corresponding teaching materials. Additionally, increased efforts should be made to provide preservice teachers with an appreciation for safe work procedures in order for students to understand and follow safe work practices.

Introduction

Within our nation's public schools, concerns for the health and safety of student populations have recently grown in importance. Unfortunately, this attention has grown out of increasing instances of premeditated violent acts. One outcome of these tragedies has been revision of school and campus safety policies by administrators and has created a sense of urgency to improve general student safety. Commonly overlooked in these policies, however, are non-violent, unintentional injuries and personnel safety training. This is notably consequential, as the cause of greatest concern for the health of children and adolescents has become unintentional injuries (U.S. Department of Health and Human Services [DHHS] 1990).

In 1995, the National Safety Council reported there were 24 deaths per 100,000 agricultural workers and 140,000 disabling farm-related injuries (National Safety Council, 1996). This situation presents a special challenge for vocational education programs that are linked with dangerous occupations such as agricultural education is to agriculture. Considering teachers and administrators stand to a limited degree in loco parentis to students under their supervision, it is a necessity for agriculture teachers to model safe practices and behaviors, and to create a positive safety climate. This is important for reducing preventable injuries, not only while the student is in school but also when they enter the workforce.

School administrators must be encouraging while diligently developing a positive school safety climate. Ullrich (1996) recommended that to progress a sense of urgency for safety education, administrators should develop a written safety plan and a detailed documentation system. Additionally, Lauver and Fraze (1995) recommended Texas agriscience teachers receive more preservice and inservice education in the areas promoting positive safety attitudes. These two efforts may yield dividends by decreasing preventable injuries in agricultural education programs.

Safety and health education for agricultural education teachers has recently received increased consideration (Thompson, 1993; Ford and Walson, 1997). Swan (1993) recommended designating local and federal funds for use in improving safety and emergency equipment and instruction available to instructors and students. The importance of safety topics in preservice and inservice educational programs (Swan, 1993; Hubert, 1996) along with basic first aid and cardiopulmonary resuscitation (CPR) training / certification for agriculture teachers (Bear and Hoerner, 1978; Laird and Kahler, 1995 and Ullrich 1996) has been suggested and offered periodically. However, in most cases it is left to individual school districts to require faculty to obtain and/or keep certifications current.

Healthy People 2000 recommended education aim at both reducing injury risk and in preparing students to be knowledgeable members of the adult community. This recommendation corresponds with goals of youth leadership organizations such as FFA. If agricultural education students are promoted as future leaders, then training and modeling of proper agricultural safety measures is desirable. This is important, especially for Texas with secondary agricultural education enrollments of almost 90,000 including 58,000 FFA members (Texas Education Agency, 1999). Teachers within these programs must model the safety skills and be the archetype of a positive safety climate endorsement.

Agriculture has one of the higher rates of fatal injuries as compared to other occupations according to the U.S. Department of Labor (1998). Since a premise of agricultural education programs is to prepare students for careers in agriculture the issue of reducing injuries, illnesses, and fatalities is essential to their training. The development of a positive and continuous safety climate within an agricultural education program is directly influenced by the personal attitudes and beliefs of the teachers managing that program. As such, a need has been established to determine the scope of health and safety education preparation for agriculture teachers including teaching resources used in secondary agricultural education programs.

Purpose / Objectives

The purpose of this descriptive study was to provide benchmark data for the assessment of the knowledge, attitudes, and perceptions regarding agricultural safety issues and curricula held by Texas agriculture teachers with less than two full years of teaching experience. The study was supported by CDC/NIOSH funds from Cooperative Agreement # U07/CCU612017. Four objectives were developed to guide this study.

1. Identify selected demographic characteristics of Texas agricultural science teachers with less than two full years of teaching experience.
2. Determine curricula and types of teaching materials used to address agricultural safety and health by Texas agricultural science teachers with less than two full years of teaching experience.
3. Ascertain most preferred and usable types of curricula as perceived by Texas agricultural science teachers with less than two full years of teaching experience.
4. Describe the emergency care preparedness of Texas agricultural science teachers with less than two full years of teaching experience.

Methods / Procedure

The target population was Texas agriculture teachers with less than two full years of teaching experience and were selected from a database of over 1400 Texas Agricultural Science teachers. The Vocational Agricultural Teachers Association of Texas (VATAT) database of first year teachers served as the frame with 98 teachers identified. Duplicates and foreign elements were removed. Missing elements were identified from university entry-year teacher lists and added which adjusted the frame to 118 identified teachers.

Descriptive research methodology was used to collect data. The instrument design was a booklet style questionnaire. The instrument contained six sections: (I) demographics, (II) agricultural curricula and teaching materials, (III) classes taught 1998-99, (IV) personal health and safety training, (V) personal beliefs and (VI) personal practices. This manuscript will only investigate the responses for Sections I-II and IV-VI. Teacher educators, and state agricultural education staff from Texas and Oklahoma served as a panel of experts to review the instrument for face and content validity. Appropriate revisions were completed based on comments. To insure reliability, the instrument was administered to several agricultural science teachers in southeast Texas. Following review and revision the instrument was distributed.

Data were collected over an eight-week period during the spring of 1999. The instrument, cover letter, self-addressed, postage-paid envelopes and detailed instructions were mailed during first week of April 1999. After approximately two weeks, reminder postcards were sent to those failing to respond. Two weeks later a second survey was mailed. Non-respondents from both mailings were phoned. A final attempt to secure data on the target population was conducted via recruitment and curricula distribution booths at the 1999 Texas FFA convention and VATAT Professional Improvement Conference.

Completed instruments were collected from 74 of the identified 118 agriculture teachers (63% response rate). Descriptive statistics, ANOVA, T-tests, and regression procedures were conducted and all results analyzed at the .05 level of significance.

Findings

Of the 74 teachers meeting the entry year qualification, there were 57 males (77.03 %) and 17 females (22.97 %). This was a larger percentage of females than the current female percentage of 8.98 percent for Texas agricultural education teachers (TEA, 1999). The mean age was 27.31 years. For data analyses teachers were placed in two groups by age: a traditional age group "20-25 years old" (n=40) and a non-traditional age group of "26 years or greater" (n=32). Males were evenly distributed between the two groups (29 and 28 respectively) while almost twice the numbers of females were in the younger grouping (11 and 6 respectively).

Teachers were well distributed throughout the VATAT areas that follow the area structure established by the Texas FFA Association. The ten Texas Areas are illustrated in Figure 1.

Figure 1. Vocational Agriculture Teachers Association of Texas (VATAT) Areas.

The highest frequency of respondents was in Areas III (14, 18.92%), IX (10, 13.51%), and X (8, 10.81%). The remaining seven Areas had between four (5.41%) and seven (9.46%) respondents per area (Table I).

Table I. Texas Entry-Year Teacher Distribution by FFA Area (1998-99).

	Area										
	I	II	III	IV	V	VI	VII	VIII	IX	X	N
Number of teachers	4	7	14	7	5	6	6	7	1	8	74

To determine distribution by school size, respondents were asked to identify the enrollment size of their school by University Interscholastic League (UIL) conference. The division levels for Texas high school competitions are based on enrollments and are divided as follows: 5A (1,780 students or greater), 4A (780-1,779 students), 3A (345-779 students), 2A (160-344 students), and 1A (159 students or fewer) (University Interscholastic League, 1999). Data indicated a mean of 146.16 students enrolled in these agricultural education programs (range 16-625) of which 91.18 were FFA members (range 5 to 350). The distribution of teachers by UIL conference / school enrollment are presented in Table II.

Table II. Entry-year Teacher Distribution By UIL Conference / School Enrollment (1998-99).

	Conference Classification					
	1A	2A	3A	4A	5A	N
Number of teachers	15	15	19	13	10	72

Teachers were asked to identify if they addressed agricultural safety and health topics as separate, individual units of instruction or as subjects within instructional units. Thirty-two teachers (43.24%) indicated that they taught safety as a separate unit with the remaining 42 teachers (56.76%) addressing safety and health as specific subjects within larger units such as "cattle handling safety" while covering cattle production.

Teachers indicated from a provided list which technologies they had available at their respective schools. The most common technology identified by all teachers was televisions with videotape players and overhead projectors. Sixty-six (90.41%) had slide projectors, while 63 (85.14%) confirmed that a computer with Internet accessibility was available. Over 60 percent (62.16) checked CD-ROM availability. The least available equipment were laserdisc players (17.57%) and one teacher declared having a laptop computer for presentations. No statistical significant differences were found based on any demographic.

As shown in Table III, teachers ranked the types of *new* teaching resources according to greatest value and use (1=most useful— 6=least useful). It was determined that the most useful formats for new materials were videotapes and study guides (mean 1.90, sd 1.00). Secondary preference was indicated for demonstrations/simulations (2.51, 1.36). Within the two age groupings, the preferred resource type was videotape and study guide, but there was a significant difference in the perceived usefulness of transparencies. The non-traditional group ranked transparencies as more useful (mean 3.59, sd 1.39), a significantly different value from the age 20-25 group (4.25, 1.10).

Table III. Entry-year Teacher Age Group Comparison of Usefulness of Teaching Resources

	Age 20-25		Age 26+		Aggregate			
	Mean	SD	Mean	SD	Mean	SD	F	P
Videotape and study guide	1.83	0.93	2.00	1.08	1.90	1.00	0.55	0.4623
Class demonstration/ Simulation activities	2.32	1.38	2.75	1.32	2.51	1.36	1.75	0.1907
Individual student booklets	3.75	1.48	3.38	1.58	3.58	1.53	1.07	0.3037
Transparencies	4.25	1.10	3.59	1.39	3.96	1.27	5.00	0.0286*
Interactive media	4.33	1.87	3.84	2.00	4.11	1.93	1.10	0.2969
Slides	4.20	1.49	4.19	1.62	4.19	1.53	0.00	0.9729

* significant at *a* = .05

Emergency care preparedness of new teachers was also a health topic of this study and is presented in Table IV. Over half of the respondents (37/72, 51.39%) had received cardiopulmonary resuscitation (CPR) training. Twenty of those teachers (54.05%) were in the age 20-25 grouping. However, only 16 of the 72 teachers (22.22%) kept certifications current.

Seventy-two teachers responded to inquiries of first aid training. Similar to CPR training, 38 (52.77%) teachers had received first aid training, with 20 (52.63%) responses coming from the younger group. Only eight (21.05%) of these 38 teachers had current certification in first-aid.

Lastly, information was sought as to identify completion of a general health and/or safety related course. Forty-three (58.90%) of the 73 teachers recorded that they had taken and completed a health class prior to teaching. Twenty-six (60.47%) of the 43 represented the age 20-25 group with the remaining 39.53 percent from the age 26 or greater group. The health and/or safety course was a requirement of graduation for just less than one third of all respondents.

Table IV. Emergency Care Preparedness and Safety Training of New Teachers in Texas

	Age 20-25			Age 26 or greater			Aggregate		
	Yes	No	Certified Currently	Yes	No	Certified Currently	Yes	No	Certified Currently
CPR trained (n=72)	20	19	8	17	16	8	37	35	16
FA trained (n=72)	20	19	5	18	15	3	38	34	8
Private industry - safety training (n=70)	11	27	NA	16	16	NA	27	43	NA
	Yes	No	Required	Yes	No	Required	Yes	No	Required
Health class	26	13	16	17	17	8	43	30	24

Conclusions

There were several areas of concern and interest documented by the findings of this study of Texas' entry year teachers. The demographic data indicated that increasing numbers of females have entered this traditionally male-dominated career field. Females made up almost one quarter of the new teachers during the 1998-99 academic year in the agricultural education classrooms across Texas. This was a substantially higher percentage as compared to the percentage of female agriculture teachers in Texas overall (nine percent). The average age of these new teachers was just over 27 years old and although considerably higher than expected, it may reflect the current practice of recruiting pre-service teachers from the ranks of college graduates in other disciplines or others returning to school following a few years of work experience in other fields. These non-traditional teacher prospects may bring a stronger sense of safety and student health responsibility to their teaching positions after serving in agricultural business operations.

An area of consequence revealed by data was the surprisingly low FFA membership percentage (62.38%) in programs with entry-year teachers. If extracurricular (FFA) activities are integral to student learning experiences, then a low membership percentage presents a unique problem for inexperienced teachers. Furthermore, the large portion of teachers that did not teach safety and health topics within larger units may substantiate a lack of continuous safety education integration in a program and a weakness in the establishment of an overall safe climate. This study also reveals an element of weakness in curricula utilized by the teacher, and in the teacher preparation programs failing to provide these individuals for the challenge of integrating safety and health concepts throughout the curriculum.

A large percentage of teachers had access to computers with both Internet access and CD-ROM's, as well as the more traditional audio/video equipment in slide projectors, televisions and VCRs. It was interesting that even though these teachers largely had access to modern computer technology, they disliked using interactive media whether from CD-ROM's or Internet as teaching tools. In comparison, they also tended to rank traditional resources such as videotapes and class demonstration / simulation activities highly. This could be indicative of not receiving adequate training on the use of newer, interactive media as teaching tools during their pre-service training programs. This appears contradictory to research that indicates students enjoy and learn well when these resources are included in teaching methodologies. Another factor to be considered regarding the lower ranking of interactive media is that easy to use, inexpensive interactive media teaching resources may not be available or accessible to these teachers.

Glaring concerns exist related to maintaining emergency care preparedness certifications and health and safety education training. Improvements are needed in this area since only a relative small percentage of the teachers are currently certified in CPR and first-aid and less than one-third of these teachers having been exposed to a required a health or safety course.

Recommendations

It is imperative that all teachers, both new and veteran groups, involved with extracurricular activities receive CPR certification and it is highly recommended that CPR certification and first-aid training be incorporated into all agriculture teacher education programs. It is further recommended that CPR certification and first aid training workshops be offered at the annual Professional Development Conference for Texas' agriculture teachers in order to help meet the recent state mandate for such training.

This study found that even though a vast majority of schools with entry-year agriculture teachers have access to computer technology, teachers do not rate the use of interactive media very highly as a teaching tool. It is recommended that teacher education programs place additional emphasis on developing these skills in teacher education programs.

A compilation of easy-to-use, interactive agricultural safety education media materials need to be developed for use specifically for agriculture teachers. For best results, these multimedia materials should be available at low or no cost to agricultural education programs through the use of state or federal funds. Furthermore, safety education and injury prevention teaching materials and resources should to be developed to specifically meet the needs of agricultural education students and teachers.

Further research may be necessary to address unique concerns of females in agricultural education. Additional investigation into the female perspective of safety and health issues could reveal topics not previously considered as high priority. Another issue for review is the finding that these teachers' were older than those considered traditional. Similar research should be undertaken to address safety and health attitudes of all agriculture teachers and in the safety climate perceptions of agricultural education programs overall. This study should be replicated annually in Texas, as well as in other states, to provide the data necessary for the longitudinal analysis of safety education. Longitudinal analysis will enable us to accurately determine the benefits and outcomes of safety education programs.

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This paper is part of a larger study conducted by the authors to assess the knowledge, attitudes, and perceptions of agricultural education teachers regarding agricultural safety issues and curricula. The previous paper presented by the authors in this session addressed the other aspects of this larger study. The authors again provide a solid background and theoretical framework for the study. I also commend the authors for having a clearly stated purpose and objectives for the study. Descriptive research methods were used to collect data for the study and appropriate analysis procedures were used.

I found the results of the study to be interesting. Many of the resources identified for teaching safety issues are traditional resources. I would be interested to know if teachers use other resources (like resource people or safety/rescue personnel with practical experiences) with their classes on safety issues? Would these not be excellent resources to use in the class and be of more practical significance in addressing safety issues? While health and safety information can be acquired from traditional sources, getting information from someone who has practical experience can be more meaningful to students.

I also raise the question concerning the information presented in Table 4. I would suspect that the health class completed by undergraduate students was just that – a health class. Safety issues important to the scope of our programs were probably not addressed. Is there an agricultural safety class undergraduate students could complete that addresses safety issues in all aspects of agriculture? Where else in the preservice curriculum can future teachers acquire information about safety issues.

I commend the authors for addressing an important topic. I would encourage them to consider research safety issues in other areas of agriculture to include issues other than the traditional safety practices we should practice. As our high school programs become more science based in nature, we need to focus on developing safe habits in these environments and must make sure our students develop these safe practices as well.

An Examination of Pollution Prevention In Montana Secondary Agricultural Education Laboratories

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Abstract

This study was designed to determine what waste management and pollution prevention practices, were being applied by Montana agricultural educators in the classroom, laboratory and field settings. When practices were not applied, barriers to implementation were examined. An attempt was also made to measure general perceptions of environmental issues and pollution prevention.

A survey titled "Pollution prevention in Agricultural Education Laboratories and Field Areas" was administered to 73 Montana Agricultural Education Programs. A final response rate of 56.2% was obtained. Anonymity was protected throughout the course of the study. The data presented in this article were part of a larger study; for the purpose of this article, focus will be kept on the three most utilized laboratory areas, (Mechanics, Wood Lab, and Green House/Farm Plot), perceptions, and barriers to pollution prevention. All data acquired from the survey are available from the author.

Results of the study found that deficiencies were identified with current practices in pollution prevention and waste management by Montana agricultural educators. Lack of knowledge, or need for further education was the primary barrier to practice and improvement of pollution prevention identified by survey respondents. Agricultural educators in surveyed in Montana, had positive perceptions of pollution prevention and appear willing to improve their practices in pollution prevention and waste management.

The participants in this study indicated a need for education in pollution prevention specific to agricultural teaching laboratories and field areas. Agricultural educators in Montana are interested in pursuing this issue. Data obtained through this study may also be pertinent in other areas of vocational education were similar teaching or research facilities are maintained.

It is recommended that a pollution prevention education or training program, specific for agricultural education, should be developed as soon as possible. It should focus on source reduction of waste, management of unavoidable waste and consideration to proper facilities planning and management. Agricultural educators themselves should be as involved as possible in the development of pollution prevention training and education. Such information should become part of a holistic pollution prevention resource for educational institutions including all traditional, academic and vocational (agriculture included) teaching areas.

Introduction/Theoretical Framework

Pollution prevention is an idea, conceived in the early 1980's, and born into national policy with the passing of the Pollution Prevention Act of 1990. The pure concept of pollution prevention (P2) deals with source reduction of waste through use of alternate (better for human health and the environment) products, practices and processes. The passing of this act helped create resources for research, education, technical assistance and development of policy and legislation.

The United States Environmental Protection Agency (EPA, 1990) summarized the multifaceted importance of practicing and teaching pollution prevention in educational settings by stating, "Reduction of pollutant emissions associated with research and educational activities is an important objective consistent with traditional environmental policy. More significantly, however, the adoption of waste minimization by the research and educational community carries with it a tremendous potential for designing pollution out of future industrial [or agricultural] processes right in the lab." Williams recognized agriculture's involvement in this arena, when he stated, "Production agriculture and agribusiness industries face, as well as contribute to, environmental concerns" (1993, p. 5).

Many schools have begun to examine their practices and take action in acting more responsibly as a whole institution in the areas of waste reduction, waste management and hazardous material management. Educators in science, especially chemistry, are examining the way they teach and conduct laboratory experiments (Collins, 1995). They are taking steps towards decreasing health risk to students, instructors and the environment by more effective management of chemicals, potential hazards and waste.

Agricultural educators and students already have an idea of how agriculture and the environment are related. In a survey conducted on the impacts of sustainable agriculture, agricultural educators and students recognized that sustainable agricultural practices involved or contributed to the following: better conservation of soil, greater management requirements, reduced use of chemicals, protection of groundwater, safer food and protection of wildlife and woodlands (Williams and Wise, 1997).

Williams supported the integration of sound environmental practices with agricultural education in 1993 when he stated, "If agricultural educators recognize these {environmental} concerns and teach their students how to develop solutions to these problems through the application of scientific principles, then the students, the agricultural industry, and the profession of agricultural education will all benefit (p. 5)."

A small percentage of research in agricultural education relates to environmental issues. Of 853 articles published in the Journal of Agricultural Education and papers presented at the National Agricultural Education Research Meetings from 1986 to 1996, only 18 dealt with what was categorized as "environmental" issues (Radhakrishna and Xu, 1997). That means only two percent of published research in these two venues were dedicated to environmental issues. Radhakrishna and Xu described environmental and sustainable agriculture topics as "emerging topics" (1997).

Bogo (1999), quoted former Tufts University dean, Anthony Cortese as saying, "If the students are learning in class about the environment and how to act responsibly, and the university through its buildings, its operations and investments is unsustainable, then they are sending a very subtle but effective message that says 'do what I say, not what I do', practicing what they preach is extremely important" (p. 39). This idea also holds true in the high school setting, especially for agricultural education.

Purpose and Objectives

This study was designed to determine what waste management and pollution prevention practices, were being applied by Montana agricultural educators in the classroom, laboratory and field settings. When practices were not applied, barriers to implementation were examined. An attempt was also made to measure general perceptions of environmental issues and pollution prevention. The specific objectives were:

1. To determine Montana agricultural educators' current practices in pollution prevention and waste management;
2. To identify barriers to implementation of practices in pollution prevention by Montana agricultural educators;
3. To determine Montana agricultural educators' perceptions of environmental issues and pollution prevention.

Methods/Procedures

Descriptive research methodology was used to fulfill the objectives of this study. Potential individuals for the study population were identified through the Directory of Montana Agricultural Educators, maintained by the Agricultural Education Program at Montana State University. Seventy-three programs were listed in the directory. Participants were contacted by postcard prior to inclusion in the survey mailing. Every program on the roster was included in the mailing; therefore, this survey was a census (Gall, Borg and Gall, 1996).

The research instrument was a survey constructed with partial adherence to the Total Design Method (TDM) published by Dillman (1978). The survey instrument is a collection of questions which were developed from review of related literature, expert advice and prior use in other related surveys or audits. There were no distinguishing features on the survey instruments which could lead to identification of participants upon return. Identification of participants by name was solely voluntary.

The survey was constructed with a combination of questions using three and five point Likert-type scales, nominal scale and open ended format. Question format was chosen on appropriateness for the type of answer desired and to maintain the highest instrument validity. Further comments were encouraged at the end of the survey on any related topic or issue. These comments are available from the author.

Twenty pilot surveys were sent out to technology education instructors in Montana secondary schools. While this audience did not maintain all of the same teaching laboratories, many similarities did exist. This audience was encouraged to evaluate the survey for content and face validity. A survey draft was also administered to an expert panel, composed of a subject matter specialists, and two agricultural education professors (university level). Appropriate adjustments were made to the instrument in accordance with comments made by pilot audience and expert panel.

A Cronbach's Alpha-Reliability Analysis was conducted using all Likert-type scale questions in the survey instrument on the final data. "For research purposes, a useful rule of thumb is that reliability should be at least .70 and preferably higher" (Franken and Wallen, 1996 p. 163). The Cronbach's Alpha-Reliability coefficient rating for this instrument was .78, therefore, the overall reliability of the survey was acceptable.

The data for this study were collected using a mailed survey instrument. A total of 73 surveys were mailed to agricultural educators in Montana secondary schools following a pre-survey post card. One e-mail reminder was transmitted and one follow up postcard mailed. Data from returned surveys were manually entered into spreadsheets where frequencies for all survey questions were calculated. Statistical analysis on early and late respondents, and reliability analysis was conducted in SPSS® 9.0 for Windows®.

Early and late respondents were examined for statistical difference by a t-test and a Mann-Whitney U test (Gall, Borg, and Gall, 1996). The hypothesis that there would be no difference was found between early and late responders, as no significant differences were found at the .05 level. Late responders were combined with early responders for the remaining data analysis. A final response rate of 56.2% was obtained.

Results/Findings

Since not all total respondents answered each section of the survey, percentages throughout the results are representative only of the frequencies of a response to that single question. The total number of responses for each question is listed under "Frequency, Total" for that question in the table, or below the table when indicated by an asterisk. Due to the sensitive nature of this survey, and the perception by the population that some answers may be incriminating, anonymity was protected. This issue also may have led respondents to omit certain demographic data, which they felt may lead to their identification.

The data presented in this article were part of a larger study which collected data in the following ten areas: 1) Demographics, 2) Program information, 3) Agricultural and power mechanics laboratory , 4) Green house and farm plot, 5) Wood laboratory , 6) Metals/welding laboratory , 7) Animal confinement area, 8) Curriculum and classroom management, 9) Perceptions, and 10) Barriers to Pollution Prevention. For the purpose of this article, focus will be kept on the three most utilized laboratory areas, (Mechanics, Wood Lab, and Green House/Farm Plot), perceptions, and barriers to pollution prevention. All data acquired from the survey are available from the author.

Agricultural or Power Mechanics Laboratory Area

Thirty-nine respondents answered questions in this section. They identified a variety of wastes generated through the activities of their agricultural or power mechanics laboratory. Four wastes were generated by over fifty percent of respondents; they are as follows: Oil frequency =35 (89.7%), Used oil filters frequency =33 (84.6%), Cleaning solvents frequency =27 (69.2%) and Antifreeze frequency =24 (61.5%). Waste diesel or gasoline was acquired by 18 (46.1%) respondents and waste transmission fluid was acquired by 17 (43.5%) respondents. Wastes acquired by the smallest number of respondents were: Batteries frequency =9 (23.0%), Brake fluid frequency =8 (20.5%), Tires frequency =5 (12.8%) and other waste frequency =2 (5.1%). Table 1 delineates these data.

Table 1. Number of programs who acquire the following wastes through teaching activities in agricultural or power mechanics laboratories.*

Type of waste	frequency	percent
Oil (O)	35	89.7
Used oil filters (OF)	33	84.6
Cleaning solvents (CS)	27	69.2
Anti-freeze (AF)	24	61.5
Diesel or gasoline (D or G)	18	46.1
Transmission Fluid (TF)	17	43.5
Batteries (B)	9	23.0
Brake fluid (BF)	8	20.5
Tires (T)	5	12.8
Other	2	5.1

* Percentage of agricultural or power mechanics laboratories acquiring said waste based on 39 respondents to this portion of the survey.

Respondents of this section were asked to first indicate their level of awareness of recycling options and best disposal methods for the wastes identified in Table 1, and then to indicate how often those options and methods are utilized or practiced. Table 2 indicates responses to these questions with wastes being divided into two categories. Oil, transmission fluid, anti-freeze, brake fluid, diesel or gas and cleaning solvents were grouped together as engine fluid wastes. Out of 35 respondents to this question, 5 (14.3%) indicated they were very aware of recycling and best disposal methods for these wastes, 19 (54.3) said they were aware, and 11 (31.4%) were not aware. When asked if they practiced recycling or best disposal methods, 9 (25.7%) answered "Always", 17 (48.6%) answered "Mostly", 8 (22.9%) "Seldom", and only 1 (2.8%) never practiced recycling or best disposal methods.

Awareness of recycling options and best disposal methods were not high with solid waste associated with the mechanics laboratory (batteries, tires and oil filters, and other). Six (17.6%) respondents out of 34 indicated they were very aware, 16 (47.1%) aware, and 12 (35.3%) said they were not aware of recycling options or best disposal methods for such waste. Level of practice of recycling options and best disposal methods for these waste, also noted in Table 2, is as follows: 7 (20.5%) respondents answered that they always practiced said options and methods, 11 (32.4%) "Mostly", 11 (32.4%) "Seldom", and 5 (14.7%) indicated "Never".

Table 2. Level of awareness and practice of recycling options and best disposal methods for previously mentioned wastes in agricultural/power mechanics laboratories.

	Type of waste			
	O, TF, AF, BF, D or G, CS * (fluids)		B, T, OF, Other (solids)	
Level of awareness	Frequency	Percent	Frequency	Percent
very aware	5	14.3	6	17.6
aware	19	54.3	16	47.1
not aware	11	31.4	12	35.3
Total	35	100.00	34	100.00
Level of practice	Frequency	Percent	Frequency	Percent
always	9	25.7	7	20.5
mostly	17	48.6	11	32.4
seldom	8	22.9	11	32.4
never	1	2.8	5	14.7
Total	35	100.00	34	100.00

* See Table 1 for explanation of abbreviations.

Where engine fluid wastes were concerned, respondents were asked to indicate whether they practiced safe storage techniques and utilized spill containment methods. The following data are also available in Table 3. Of 35 respondents to these questions, 32 (91.4%) indicated that they used sealed containers or spill prevention in storage areas. Three (8.6%) respondents indicated that they did not. Only 16 (45.7%) respondents indicated some sort of spill containment method was used in the work area, the remaining 19 (54.3%) indicated that no such methods were used.

Table 3. Practice of safe storage methods and spill containment for engine fluid wastes.

	Use of sealed containers and spill prevention in storage area		Use of spill prevention and spill containment in work area	
	Frequency	Percent	Frequency	Percent
Yes	32	91.4	16	45.7
No	3	8.6	19	54.3
Total	35	100.00	35	100.00

Green House and or Farm Plot

Respondents answered a bank of questions related to storage methods and practices of pesticides and agricultural chemicals. Data related to these questions are presented in Table 4. Twelve of 21 (57.1%) respondents maintained an inventory of pesticides on school property, while the remaining 9 (42.9%) did not. Eighteen of 20 (90.0%) respondents maintained this inventory in a secure area, safe from water penetration, while 2 (10.0%) did not. Seventeen of 20 (85.0%) indicated that their pesticides were well labeled and identified, while 3 (15.0%) indicated otherwise. Of 16 respondents to the question concerning routine calibration of spraying equipment, 10 (62.5%) indicated that they regularly calibrated sprayers, while 6 (37.5%) indicated they did not engage in such activity.

Table 4. Occurrence of proper practices in pesticide storage, and handling in greenhouses and/or farm plots.

	Pesticide inventory maintained on property		Use secure storage area safe from water penetration		Pesticides well labeled and identified		Regular calibration of sprayers	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Yes	12	57.1	18	90.0	17	85.0	10	62.5
No	9	42.9	2	10.0	3	15.0	6	37.5
Total	21	100.00	20	100.00	20	100.00	16	100.00

Further questioning into proper pesticide application and handling techniques revealed (also shown in Table 5) that out of 21 respondents, 8 (38.1%) always applied pesticides to deal with targeted organisms, 8 (38.1%) mostly followed this trend, while 4 (19.0%) seldom did and 1 (4.8%) never applied pesticides for target organisms only. Of 21 respondents, 13 (61.9%) indicated that they always followed recommended application rates, 8 (38.1%) indicated they mostly followed recommended application rates and no one answered seldom or never. When asked if pesticides were mixed on a pad that would contain spills and prevent contamination of soils or water resources, 5 out of 19 (26.3%) indicated they always used such an area for mixing, 6 (31.6%) mostly did, 6 (31.6%) more indicated they seldom use of such an area, and 2 (10.5%) never.

Table 5. Level of practice of proper pesticide application and handling techniques.

	Apply for target organisms only		Follow recommended application rates		Use spill containment measures while mixing	
Level of practice	Frequency	Percent	Frequency	Percent	Frequency	Percent
Always	8	38.1	13	61.9	5	26.3
Mostly	8	38.1	8	38.1	6	31.6
Seldom	4	19.0	0	0.0	6	31.6
Never	1	4.8	0	0.0	2	10.5
Total	21	100.00	21	100.00	19	100.00

Twenty-one persons responded to the question concerning the use of personnel safety measures, such as clothing, gloves, and eye wear. Table 6 describes these data. Of those 21 respondents, 12 (57.1%) always made use of such measures, 7 (33.3%) mostly did, 2 (9.6 %) seldom took such measures, and no one indicated never. Sixteen of 31 (51.6%) respondents always store chemicals in original containers, 14 (45.2%) answered mostly, no respondent indicated seldom, while 1 (3.2%) indicated chemicals were never stored in original containers. None of 21 respondents indicated that they always compost old plant material, 8 (38.1%) indicated they mostly did, 9 (42.9%) indicated they seldom did, and 4 (19.0%) never composted old plant material.

Table 6. Level of practice of recommended techniques related to agricultural chemical safety, storage and alternative techniques (compost).

	Take recommended personal safety measures (clothing, gloves, eye wear)		Store chemicals in original containers		Use old plant material for compost	
Level of practice	Freq.	Percent	Freq.	Percent	Freq.	Percent
always	12	57.1	16	51.6	0	0.0
mostly	7	33.3	14	45.2	8	38.1
seldom	2	9.6	0	0.0	9	42.9
never	0	0.0	1	3.2	4	19.0
Total	21	100.00	31	100.00	21	100.00

Twenty respondents answered the first question concerning awareness of recycling options and proper disposal methods for agricultural chemical containers (see Table 7). Three (15.0%) respondents indicated they very aware of such options and methods, 13 (65%) indicated they were just aware, and 4 (20%) were not aware. Three respondents of 21 (14.3%) indicated they always recycled or properly disposed of chemical containers, 10 (47.6%) mostly used such options or methods, 5 (23.8%) indicated seldom, and 3 (14.3%) indicated recycling options or proper disposal methods were never used.

Table 7. Level of awareness and practice of recycling and proper techniques in agricultural chemical and chemical container disposal.

	Recycling options and proper disposal methods for agricultural chemicals and empty chemical containers	
Level of awareness	Frequency	Percent
very aware	3	15.0
aware	13	65.0
not aware	4	20.0
always	3	14.3
mostly	10	47.6
seldom	5	23.8
never	3	14.3
Total	41	200.00

Wood Laboratory

The following data are also available in Tables 8 and 9. All 30 (100.0%) respondents to the wood laboratories section of the survey indicated that they had surplus paint in their laboratories, 25 (83.3%) indicated that possessed surplus stains, 23 (76.6%) possessed surplus solvents and strippers, and 3 (10.0%) indicated that they also possessed other similar materials. Thirty-four responses were made to the question concerning storage of the previously mention wood finishing chemicals on site. Thirty-three respondents (97.0%) indicated that they did store such chemicals, while 1 (3.0%) indicated such chemicals were not stored on school property for more than a few days. Twenty-three of 33 respondents (69.7%) indicated that such chemicals were stored in a fire retardant cabinet, 10 (30.3%) indicated such chemicals were not. Out of 29 respondents, 20 (69.0%) indicated that they were aware sawdust could be composted, the remaining 9 (31.0%) were not aware.

Table 8. Types of waste generated in wood laboratory.*

Type of waste	Frequency	Percent
Paint (P)	30	100.0
Stain (ST)	25	83.3
Solvents/strippers (SO)	23	76.6
Other	3	10.0

*Percentages based on 30 respondents who maintain wood laboratories in their program.

Table 9. Occurrence of proper storage technique of wood finishing chemicals and awareness of alternative disposal method (compost) for sawdust.

	Store P, ST, SO, or other waste on property		Paints and solvents stored in fire retardant cabinet		Aware clean sawdust can be composted	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	33	97.0	23	69.7	20	69.0
No	1	3.0	10	30.3	9	31.0
Total	34	100.00	33	100.00	29	100.00

When asked if they were aware of proper disposal techniques for wood finishing chemicals, also as seen in Table 10, 3 (9.0%) of 34 total respondents indicated that they were very aware of proper methods, 16 (47.0%) indicated they were aware, and 15 (44.0%) answered not aware. Next, respondents indicated the level of practice of proper disposal for wood finishing chemicals. Thirty-three responses were made for this question. Four (12.5%) respondents always used proper methods, 6 (18.8%) mostly used proper technique, 14 (43.7%) seldom use proper methods, and 8 (25.0%) never use proper disposal methods for wood finishing chemicals.

Table 10. Level of awareness and practice of proper disposal techniques for wood finishing chemicals (paint, stain, solvents/strippers and other waste).

	Recycling options and proper disposal methods for paint, stain, solvents/strippers and other wood shop chemical waste	
Level of Awareness	Frequency	Percent
very aware	3	9.0
aware	16	47.0
not aware	15	44.0
Total	34	100.00
Level of Practice	Frequency	Percent
always	4	12.5
mostly	6	18.8
seldom	14	43.7
never	8	25.0
Total	32	100.00

Barriers to Pollution Prevention

Barriers to practice, or improved practice, of pollution prevention were addressed at the end of the survey, and the data presented in Table 11. Thirty-nine responses were recorded for this section, more than one answer was accepted per respondent. Thirty-three (84.6%) respondents indicated that increased knowledge could improve their pollution prevention, 10 (25.6%) indicated increased administrative support could improve their practices, 23 (58.9%) indicated new funds would improve pollution prevention practices, 12 (30.7%) listed increased community support as a barrier reducing factor, 28 (71.8%) indicated more community resources could help improve pollution prevention, and 5 (12.8%) answered "other." Table 11 describes this data.

Table 11. Reduction in barriers to pollution prevention.

Reduction of barrier	Frequency	Percent*
Increased knowledge	33	84.6
Increased administrative support	10	25.6
New funds for implementation of more P2	23	58.9
Increased community support	12	30.7
More community resources**	28	71.8
Other	5	12.8

*Percentages based on an Frequency of 39 respondents to this portion of the survey.

**(recycling, special collections, outside assistance) These are waste management systems, not P2 in the strict definition.

Perceptions of Environmental Issues in Agriculture

A measurement was made on the level of agreement with seven statements concerning concepts of agriculture's relation to environmental responsibility and regulation, pollution prevention and waste management. Respondents answered using the following scale: Strongly agree (SA), Agree (A), Disagree (D), or Strongly disagree (SD). The question, frequency of responses and percentages all presented in Table 12.

Table 12. Level of agreement with statements concerning perceptions of waste management and pollution prevention in a broad agricultural setting.

Question		SA	A	D	SD	Total
The behavior of one person or group can have a significant affect on larger environments.	Freq.	19	22	0	0	41
	Percent	46.3	53.7	0.0	0.0	100.00
Agriculture is dependent on clean safe soil, air and water.	Freq.	27	14	0	0	41
	Percent	65.9	34.1	0.0	0.0	100.00
Agriculturalists are responsible for their own actions concerning the environment.	Freq.	20	18	0	1	39
	Percent	51.3	46.2	0.0	2.5	100.00
Monetary cost, time and labor are issues to be considered when making decisions which may affect	Freq.	4	33	3	1	41
	Percent	9.8	80.5	7.3	2.4	100.00
Considering the previous issues, it is still possible for agriculturalists to make environmentally responsible	Freq.	14	24	1	0	39
	Percent	35.9	61.5	2.6	0.0	100.00
Agriculturalists are currently doing enough to protect the environment and sustain their industry.	Freq.	0	18	21	0	39
	Percent	0.0	46.2	53.8	0.0	100.00
Agriculturalists are capable of policing themselves without intervention by the government and	Freq.	5	20	15	1	41
	Percent	12.2	48.8	36.6	2.4	100.00

Conclusions, Recommendations, and Implications

Based on the analysis of quantitative data, and consideration for written comments by survey respondents, the following **conclusions** were drawn:

1. Deficiencies were identified with current practices in pollution prevention and waste management by Montana agricultural educators. The results indicate the most eminent are in the mechanics laboratory, greenhouses and farm/field plots, and in the wood laboratory.

2. Lack of knowledge, or need for further education was the primary barrier to practicing pollution prevention identified by survey respondents.

3. Agricultural educators in Montana had positive perceptions of pollution prevention. Most agreed that agriculturalists are responsible for their own actions concerning the environment and that the actions of few can have a wide effect.

4. Montana agricultural educators do have a basic knowledge or awareness of pollution prevention and proper waste management. On all questions dealing with awareness, over 50% of respondents indicated they were aware or very aware of the topic and practices associated with

that question. Re: tables 2, 7, and 10, dealing with awareness of recycling options and proper disposal techniques for mechanics laboratory waste, agricultural chemicals, and wood finishing chemicals.

The entire research process, including review of literature, collection and analysis of data, and consideration of comments made by survey respondents, committee members and others led the researcher to make the following **recommendations**:

1. A pollution prevention education or training program, specific for agricultural education, should be developed as soon as possible. It should focus on source reduction of waste, management of unavoidable waste and consideration given to proper facilities planning and management.
2. Agricultural educators themselves should be as involved as possible in the development of pollution prevention training and education.
3. Pollution prevention training should be made an integral part of college studies for those pursuing teaching degrees in agriculture. Pollution prevention should be part of career-long updates and re-certification programs for educators.

The data and written comments provided by this survey allowed the researcher to define the following **implications**:

1. Education on managing agricultural teaching laboratories in an environmentally responsible way should not only target instructors or educators. Students and administrators, while on opposite ends of the educational spectrum, are also integral components of successful pollution prevention initiatives being taken in the teaching laboratory.
2. Data obtained through this study may also be pertinent in other areas of vocational education were similar teaching or research facilities are maintained. Such research can also contribute to that which has already been done in other areas such as chemistry and biology education.
3. A potential exists for agricultural educators to receive reprimands, should a regulatory agency scrutinize current practices in waste management and pollution prevention.

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An Examination of Pollution Prevention In Montana Secondary Agricultural Education Laboratories

A Critique

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Everyone of us pollutes the environment each day, whether we think about it or not. In fact, human beings have been polluting the environment for longer than we can imagine. Yet, we live in a society today which is gravely concerned about the environment in which we live. As a result, Congress has passed policies concerning pollution prevention. Furthermore, a topic in the presidential election this year will focus on the environment and what we can do to improve the quality of the environment in which we live.

The purpose of this study was to determine what waste management and pollution prevention practices were being applied by Montana agricultural educators in classroom, laboratory, and field settings. In a day where there is much emphasis on environmental issues, this line of inquiry is most needed in the profession. The authors do an excellent job of presenting the introduction and theoretical framework for this study. The purpose and objectives are well defined and the methodological procedures are sound.

I would raise the following questions on the procedures and methods of the study. Was a five point Likert-type scale used in the study or was actually a four point Likert-type scale used? The procedures section of the study mentions a three and five point Likert-type scale while the tables in the results section indicates a four point Likert-type scale was used. Also, how was the reliability of the questionnaire determined? If there are different sections of the questionnaire that used different Likert-type scales, should not reliability coefficients be determined separately for each section? I noticed that only one reliability coefficient was reported. Does this reflect the true reliability of the survey instrument?

The results of the study were very interesting. I was amazed at the lack of awareness and practice agricultural education teachers has about recycling options. It is evident in Table 11 that increased knowledge can help make a difference in the lack or awareness and practice. How can the profession provide this knowledge? Do we need to integrate these concept into the undergraduate program or have professional development activities for teachers on a periodic basis?

I commend the authors for this line of inquiry. I hope the profession can make a difference in helping improve the environment in which we live and educating people to become more conscience about pollution prevention practices.

A Formative Evaluation of Valle Grande Rural Institute in Cañete, Peru

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The purpose of this paper was to appraise the quality of recommended cotton fertilization practices Valle Grande Rural Institute, a nongovernmental organization in Cañete, Peru. In addition, the researchers examined Cañete's low resource farmers' ability to incorporate two alternative cash crops (grape and asparagus) into their livelihood system. It has been documented that much of the on-experiment station agronomic research in developing countries has very limited generalizabiltiy to low resource farmers. A data set of 622 cotton production records were used in the development of production functions (regression equations) that examined the relationship between lint production and fertilization inputs. An environmental index was included in these analyses to control for biophysical and socioeconomic conditions. Linear programming was used to determine the low resource farmers' ability to adopt the alternative cash crops. Data for the linear programming model were collected from a Sondeo (n=22), personal interview survey (n=60), and selected secondary sources. During the seven year period that fertilization practices were examined, nitrogen and phosphorous contributed to production in only three of the seven zones. Both only contributed positively to cotton production in one of the three zones. Based upon the results of the linear programming model, these low resource farmers did not have the inputs necessary for grape production. Only 40% of the farmers would be capable of producing asparagus.

Introduction & Theoretical Framework

Agricultural extension is more than "interventology" (Roling, 1990, p. 12). Agricultural extension is "the business of facilitating learning, of helping people usefully to construct effective action in the domain of existence" (Roling, 1998). Successful programming is farmer-centered and involves an extensionist who assumes the role of facilitator, learner, and consultant. As a result, ours is a discipline that is primarily concerned with social learning (Roling, 1998).

Formative evaluations of agricultural extension programs in developing countries are essential. Two major factors contribute to the need for formative evaluations. First, much of the on-station research, which results in approved practices, has limited generalizability beyond the agricultural experiment stations (Hildebrand & Russell, 1996). Secondly, often practices are a result of research or indigenous knowledge conducted exclusively on-farm, and may suffer credibility that limits broader adoption (Baker, Koyama & Hildebrand, 1999; Baker, Araujo & Hildebrand, 1998).

Small, limited resource farming communities are highly elaborate systems. A comprehensive analysis of a livelihood system includes land, labor, and capital requirements for sustaining the household. Household composition, gender–related responsibilities, off-farm or non-farm activities, land ownership, credit availability, marketing information, and production seasons and cycles all directly or indirectly impact crop and animal agro-systems, which impact households (Rocheleau, 1987; McDowell & Hildebrand, 1986; Cabrera, 1999; Sullivan, 1999).

Background Information

The Cañete Valley is located on the central coast of Peru. It consists of 22,600 ha of agricultural land, and its elevation varies from 0 to 700 meters. The life of this desert-like valley is the Cañete River, which flows continuously throughout the year. The temperature varies from 12° C in the winter to 32° C in the summer. There are 152,379 valley residents, with an average annual income of US$1,420 per household. There are seven individuals per household.

Valle Grande Rural Institute (VGRI) is a non-governmental organization (NGO) that has been in existence for more than 30 years, promoting rural improvement through extension and education programs designed for low income farmers. VGRI reaches more than 1,000 small farmers in different programs annually. The operating budget of VGRI comes from different sources; approximately one-third of it is from local resources (services have a minimum charge), another one-third is raised through local and national donations, and the additional funds are provided from international institutions. The VGRI has a target population of 4,800 small farmers with 12 ha or less.

VGRI currently operates a coastal extension office, a mountain extension office, an entrepreneurial development office, a soils laboratory, and an agricultural college. With the exception of the mountain extension office, the offices, laboratory, and college collaborate in serving the needs of the Cañete Valley farmers.

Purpose and Objectives

The overall purpose of this study was to appraise the quality of selected recommended agricultural practices of VGRI. The specific objectives of the study were to:

1. assess the validity of VGRI recommended fertilization practices for cotton production; and
2. determine the capability of limited resource farmers to adopt grape and asparagus enterprises that had been recommended by VGRI in previous years.

Methodology

The population and sample differed based upon the multiple data collection methods used by the researchers. Production functions were utilized to assess the approved practices for cotton fertilization. Small farmers who borrowed money through the VGRI between 1992 and 1998 (N= 1,860) served as the population. A purposeful sample (n= 622) consisting of farmers with complete records was used to develop the production functions. The dependent variable was cotton yield per ha in quintals (100 lb.). The independent variables in the regression models were nitrogen in kilograms (N), phosphorus in kilograms (P), potassium in kilograms (K), annual environmental index (average production per ha for the specific year in quintals – EI), and the following interactions (EI x N, EI x P, EI x K).

The EI is the result of calculating the average of all available production data for each year. In 1996, Hildebrand and Russell indicated that an environment includes both biophysical and socioeconomic factors. Broadly speaking, environments can be classified by farm type, nature of the farm household, climate, soils, farmer management, and others (i.e. agro-ecological zone or by commonly reoccurring pests). Production functions were calculated for seven unique agro-ecological zones within the Cañete Valley (Figure 1).

The annual environmental conditions are responsible for drastic changes in the yield variable of the cotton crop. For analysis and recommendation purposes the production years were divided into good (more than 60 qq/ha), fair (between 46-59 qq/ha), and poor (45 qq/ha or less).

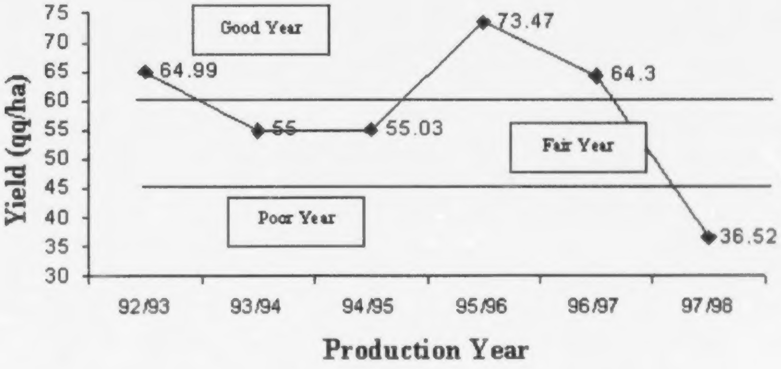

Figure 1. Annual Environmental Index for Cotton Yield in Cañete.

Linear programming was used to determine the capability of the targets to adopt the recommended alternative crops of grapes and asparagus. Data from numerous sources including a *sondeo*, survey, and selected secondary data were used in the development of the linear programming (LP) model. First, six multidisciplinary professionals conducted a *sondeo* (May 11 to 15, 1998) consisting of a sample of 22 farmers in the area. Members of the team had expertise in extension education, economics, and technical agriculture production. A *sondeo* is an open-ended, non-structured interview technique. The *sondeo* is an important needs assessment tool used frequently in the Farming Systems Research and Extension approach to agricultural development (Hildebrand, 1976). A properly conducted informal survey can provide accurate and comprehensive information on the ecology of farming and related practices (Rhoades & Bidegaray, 1987). According to Freanzel (1984), the *sondeo* has the following four distinguishing characteristics:

1. Farmer interviews are conducted by researchers themselves,
2. interviews are essentially unstructured and semi-directed, with emphasis on dialogue and probing for information (written questionnaires are never used),
3. informal random and purposive sampling procedures are used, and
4. the data collection process is dynamic. (p.1)

Each interview lasted between one and two hours. At least one adult household member was interviewed. In addition to the interviews, the researcher made and recorded personal observations regarding each household.

Second, one of the researchers conducted a survey (May 18 to July 17, 1998) consisting of structured questions developed based upon personal knowledge of the Cañete Valley, and the *sondeo* results. A questionnaire consisting of 70 items was developed. The instrument contained three sections. The first section had three subsections: (1) household information, (2) agricultural factors, and (3) economic information. The second section consisted of seven open-ended needs assessment questions. The final section included 13 open-ended questions regarding farm problems and concerns.

The population for the survey consisted of limited resource farmers in the Cañete Valley (N=4,800). A random sample of 60 farmers was selected for participation in the survey. In an effort to collect information that was reflective of the population, the researchers used a map of the Cañete Valley and divided the area into 60 zones. One zone was then randomly selected at a time by a computer program. The researcher subsequently randomly selected a limited resource household to interview in each zone. All households had an equal chance of being selected. Data were collected from a broad cross section of Cañete Valley residents. This technique allowed for equal geographic representation of subjects.

For both the *sondeo* and survey, households had to meet the following criteria: (1) farm less than 12 ha of land, (2) have a net annual income less than US$5,000, and (3) generate the majority of the household's income from agricultural production.

Secondary data were also used to complete the LP model from records maintained by the VGRI, from records maintained by the city government, and from records of Peru's Ministry of Agriculture. The data were analyzed using Microsoft® Access 97 SR-1, Microsoft® Excel 97 SR-1, and Microsoft® Visual Basic.

Based upon the data gathered, the assumptions identified in Table 1 of the livelihood systems of limited resource farmers in the Cañete Valley were made by the researchers. The linear programming model was designed to maximize discretionary cash at the end of the six-year model, after first satisfying all basic family needs.

Table 1
Assumptions of the Linear Programming Model

	Assumptions
1	There are two production seasons in Cañete. The matrix was divided into these two seasons: (1) August 15-April 14, and (2) April 15 – August 14.
2	Land is a limited resource in Cañete. Land use is intensive.
3	Renting land out to others and renting land from others were common practices of the limited resource Farmers in Cañete.
4	Labor is a limited resource, and labor availability is related to household composition.
5	Households can employ people in labor-intensive seasons, and it is common in households with available labor to work for others to supplement household income.
6	Water is not a limited resource in the August through April production season, but it is in the subsequent season.
7	Management is an aggregate index computed by summing the total years of education of every member in each household.
8	Credit is an available resource for cotton and maize in the August through April production season and for maize in the subsequent season. Interest rates range from 8-10% from development agencies and the banking industry. Credit is available for grape and asparagus production. However, cash credits for inputs from retailers are available at a rate of interest up to 100%.
9	Each household has some cash at the beginning of each season, used for household expenses, livestock, or production inputs.
10	The household and livestock consume maize and sweet potatoes produced on the farm. The family requires a certain amount of livestock produced on the farm.
11	Cash is transferred from one production season to another, and consequently one year to another.
12	The cash at the end of the year could be a negative value, indicating a non-sustainable system.

Results

The analysis of the cotton production functions demonstrated enormous variability among geographic zones in relation to yield and its response to fertilizers and environmental factors (Table 2). For example, the addition of N significantly contributed to production in only three of the seven agro-ecological zones. It should be noted that the regression coefficient for N was negative in two of these three zones. However in all zones the approved cotton production practice recommended by VGRI was to add from 110 – 250 kg/ha of N. Similar results were found for the regression coefficient for P (significant in three of the zones, and positive in only one of the zones).

A six-year linear programming model was developed to examine the viability of VGRI clients in adopting either a grape or an asparagus enterprise. Asparagus and grapes are two introduced crops being encouraged by development agencies. They are perceived as complex, but profitable. In an effort to encourage the adoption of these perennial crops, the development agencies are providing the financing necessary to establish the crops.

Table 2
Summary of Cotton Production Function Coefficients Based Upon Geographic Region

Geographic Zone	Intercept	R^2	N[a]	P[b]	K[c]	EI[d]	EIxN[e]	EIxP[f]	EIxK[g]
Cerro Alegre	88.79	.51	CN[h]	-4.01	-0.34	-6.16	CN[h]	0.071	CN[h]
La Quebrada	77.69	.51	CN[h]	-0.19	CN[h]	CN[h]	CN[h]	0.014	CN[h]
Palo Isla	-81.50	.84	-1.72	CN[h]	3.58	CN[h]	0.012	CN[h]	CN[h]
Santa Barbara	119.45	.30	CN[h]	CN[h]	-1.66	CN[h]	CN[h]	-.006	0.020
San Benito	44.57	.36	-0.87	CN[h]	1.58	CN[h]	0.016	-.025	CN[h]
San Francisco	-63.01	.77	0.46	4.90	-5.57	CN[h]	CN[h]	-.088	0.103
Quilmana	52.06	.54	CN[h]	CN[h]	-.84	CN[h]	CN[h]	CN[h]	0.010

N[a] Nitrogen in kg/ha; P[b] Phosphorus in kg/ha; K[c] Potassium in kg/ha; EI[d] Environmental Index; EIxN[e] the Environmental Index and Nitrogen in kg/ha Interaction Variable; EIxP[f] the Environmental Index and Phosphorus in kg/ha Interaction Variable; EIxK[g] the Environmental Index and Potassium in kg/ha Interaction Variable; CN[h] Regression Coefficient Not Statistically Significant at alpha of .05

The model maximized the sum of the end of the year cash for all six years after meeting all household (family) consumption needs. VGRI collaborates with other development agencies in financing the establishment of both crops. In the case of asparagus, there is a requirement that a small farmer plant at least one hectare due to harvesting and marketing concerns. Table 3 reveals the resource needs of asparagus in the six year model.

Similarly, the grape resource needs are presented in Table 4. These analyses revealed that no household was financially capable of adopting a grape production enterprise. However, 25 of the 60 would be able to adopt one-hectare of asparagus.

In an attempt to explain the adoption curve for the production of asparagus, the researchers examined overall household system dynamics. Without losing system diversity, there were some naturally occurring household groupings (Table 5). Those 25 households were characterized as having fewer children living at home and consequently, more available adult labor. These households were also characterized as having larger farms and more fertile farms (located in the lower to middle valley range). Finally, these households were the more highly educated.

Table 3

Asparagus Resource Needs in the Six-Year Linear Programming Model (per hectare)

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Male Labor[a] I[b] (days)	15	15	45	30	30	30
Male Labor II[c] (days)	15	15	45	30	30	30
Female Labor I (days)	2	4	15	12	12	12
Female Labor II (days)	2	4	15	12	12	12
Water I (m^3)	3,000	3,000	3,000	3,000	3,000	3,000
Water II (m^3)	1,500	1,500	1,500	1,500	1,500	1,500
Management I (Unit)	5	5	5	5	5	5
Management II (Unit)	5	5	5	5	5	5
Credit I (Soles[d])	2,500	2,500	2,500	2,000	500	2,500
Credit II (Soles)	1,500	1,500	1,500	1,500	500	2,000
Household Cash I (Soles)	-----	500	500	500	500	500
Household Cash II (Soles)	-----	500	500	500	500	500

Labor[a] Denotes labor (either male or female) that is determined by the number, age, and gender of the household members. Each child younger than 5 years requires 0.75 day-labor per day, each child between 5 to 14 years contributes 0.5 day labor per day as well as the males older than 65 years and the females older than 75 years. The males between 14 to 65 and the females between 14 to 75 years contribute 1.00 day-labor per day to the household. The female labor is more limited than the male because they attend children, maintain the home, and care for most of the livestock; I[b] Denotes labor required for the first production season (August 15-April 14); II[c] Denotes labor required for the first production season (April 15 - August 14); Soles[d] - 3.5005 Peruvian Soles = 1.00 US Dollar

Table 4

Grape resource needs in the Six-Year Linear Programming Model (per hectare)

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Male Labor[a] I[b] (days)	20	15	30	30	30	30
Male Labor II[c] (days)	20	15	30	30	30	30
Female Labor I (days)	5	5	30	30	40	40
Female Labor II (days)	5	5	30	30	40	40
Water I (m^3)	2,500	2,500	2,500	2,500	2,500	2,500
Water II (m^3)	1,500	1,000	1,000	1,500	2,500	1,000
Management I (Unit)	5	5	5	5	5	5
Management II (Unit)	5	5	5	5	5	5
Credit I (Soles[d])	3,000	3,000	3,000	2,500	1,000	2,500
Credit II (Soles)	1,500	2,000	2,000	2,000	500	2,500
Household Cash I (Soles)	-----	1,000	1,000	1,000	500	500
Household Cash II (Soles)	-----	500	500	500	1,000	1,000

Labor[a] Denotes labor (either male or female) that is determined by the number, age, and gender of the household members. Each child younger than 5 years requires 0.75 day-labor per day, each child between 5 to 14 years contributes 0.5 day labor per day as well as the males older than 65 years and the females older than 75 years. The males between 14 to 65 and the females between 14 to 75 years contribute 1.00 day-labor per day to the household. The female labor is more limited than the male because they attend children, maintain the home, and care for most of the livestock; I[b] Denotes labor required for the first production season (August 15-April 14); II[c] Denotes labor required for the first production season (April 15 - August 14); Soles[d] - 3.5005 Peruvian Soles = 1.00 US Dollar

Table 5
The Relationship Between the Adoption of Asparagus Production and Household Composition

Ha of Asparagus	Composition One[1]	Composition Two[2]	Composition Three[3]	Composition Four[4]	Land (ha)	Management/ Education
No Asparagus (13.33%)	0.50	0.79	1.71	1.64	4.35	20.69
Less than 1ha (35%)	0.19	0.67	2.24	2.14	4.11	31.90
1 ha or greater (41.67%)	0.08	0.56	2.56	2.60	5.45	38.19
Solution for "Average" Household .84 ha of Crop	0.21	0.65	2.25	2.22	0.18	31.48

[1] Number of males and females less than five years of age
[2] Number of males and females between five and fourteen years of age
[3] Number of males between fourteen and sixty-five years of age
[4] Number of females between fourteen and sixty-five years of age

Conclusions and Recommendations

In terms of cotton production, the results of this study revealed the need for VGRI extensionists to make fertilization recommendations on an individual household basis, being particularly cognizant of agro-ecological zones. The production functions demonstrated that, contrary to common belief, higher yields are not necessarily reached with higher amounts of fertilizers. Actual recommended fertilizer rates are too high, probably being based upon trails conducted on the very best soils in good years. This finding also has significant implications for environmental pollution associated with overfertilization practices and subsequent leaching from the soil into the water system.

It should be noted that the fertilization rates used by the farmers in these analyses were the amounts recommended by VGRI (i.e. 110-250 kg nitrogen/ha). As a result, there was little experimental variation within zones. Therefore, it is recommended that on-farm trials with greater variability in nitrogen and phosphorous rates be conducted.

The production functions can also be used as decision-making tools based upon rather predictable weather patterns in the area. During the El Nino and La Nina years, a poor year (due to extreme weather conditions) might become a good year for some geographic regions of Cañete (i.e. Cerro Alegre and San Francisco) if recommended fertilizations were adequately adjusted. Not only might production be increased, but also due to the deleterious effect of the weather on production in other growing regions, the farmers could get the added benefit of higher cotton prices.

As per the linear programming results, small farmers should not be a targeted audience for grape production. In addition, only approximately 40% of the target clientele would be able to add an asparagus enterprise. Perhaps the biggest advantage to developing the linear programming model is that it is now readily available to use as a consulting tool at the individual household level. It can be used by extensionists to predict differing household livelihood system responses based upon various scenarios.

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A Formative Evaluation of Valle Grande Rural Institute in Cañete, Peru

A Critique

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Auburn University

Formative evaluations are valuable in determining program performance feedback relative to program process and/or program outcomes. Information received from such evaluations can help make modifications to programs in order to better utilize program resources.

This study sought to appraise the quality of recommended cotton fertilization practices of Valle Grande Rural Institute, a nongovernmental organization, in Canete, Peru. Furthermore, the paper sought to examine Canete's low resource farmers' ability to incorporate two alternative cash crops into their livelihood system. The purpose and objectives of the study were clearly stated. The authors did an excellent job of providing background information for the study. The authors did an adequate job in defining the theoretical framework, however, I would encourage the authors to expand some more on the theoretical framework.

Appropriate and interesting research procedures were used to collect data in the study. However, I have some questions regarding the sample sizes used in the study. When collecting data to use in the production function, why was such a large sample size (n=622) used? In most cases, is not a sample size of 300 appropriate for generalizability? Furthermore, why was such a small sample (n=60) used to collect data for the linear programming function? I am curious to know why there was such a discrepancy in the sample sizes used in the study.

I had some difficulty in understanding the results from the study, primarily in understanding the information reported in the tables. I would encourage the authors in further publications to thoroughly explain the information in the tables so the readers can clearly understand the results of the study.

I found the conclusions to be straightforward. However, I wish the authors would consider developing more programmatic recommendation for practice and research. What could be some specific practices recommended to the farmers and what could be additional areas that could be evaluated in this study?

In closing, I commend the authors for conducting an important study. Such evaluations are necessary in extension activities in programmatic changes are to occur. Since this paper of only part of a larger study, I would be interested to read the other results and conclusions of the study. I encourage the authors to see to report this information and encourage their assistance in helping to improve farming practices in Peru.

Professional Development Needs of State Extension Specialists

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Abstract

A study was conducted to determine critical professional development needs of state extension specialists in South Carolina. Three constructs--program development and evaluation, research generation and synthesis, and communication and presentation were examined. Descriptive research methodology design was used to conduct the study. The population consisted of all 78 extension specialists employed by Clemson University. Specialists were asked to rate 35 statements relative to the three constructs, using a five-point Likert scale (1 = low to 5 = high), the importance they place on each statement and the degree to which they possessed the ability. In addition, demographic information was also gathered. Matrix analysis was used to determine critical professional development needs of specialists. Matrix analysis identified four quadrants which were labeled as 1) High level successful abilities--HLSA (high levels of importance and ability), 2) Low level success abilities--LLSA (low levels of importance and high levels of ability), 3) Low level needs--LLN (low levels of importance and ability), and 4) Critical needs--CN (high levels of importance and low levels of ability). A total of 47 specialists responded for a return rate of 60 percent. A post-hoc reliability analysis indicated that the instrument had acceptable reliability (Alpha ranged from a low of .74 to a high of .87). Descriptive statistics were used to summarize the data. Results of matrix analysis revealed three critical needs--one in program development and evaluation and two in research generation and synthesis. Critical needs identified were: 1) communicating program impact to key decision makers, 2) communicating client problems to researchers, and 3) view problems from different perspectives. In addition, 11 low level needs were also identified. Of these eleven, seven were in program development and evaluation, three in research generation and synthesis, and one in communication and presentation. Overall, extension specialists perceived themselves as possessing a high level of competence in nearly half of the professional development needs examined in this study. Three recommendations were offered based on the findings of the study. First, need for professional development training in the areas identified as critical should be given top priority. Second, training in areas identified as low level needs should be reinforced on a regular basis. Finally, a Professional Development Task Force be appointed to address critical issues relative to professional development of extension faculty and staff.

Introduction/Theoretical Framework

The linkage between extension specialists and the county agents is the bridge between people's needs and the knowledge base of the university (Boyle, 1996). Extension specialists have the responsibility to synthesize, evaluate, integrate, and apply research information and expertise from within the land-grant university system in support of county programming efforts (Taylor and Summerhill, 1994).

County extension agents and program assistants depend on specialists for information and publications (Baker and Villalobos, 1997). Specialists have expertise in locating and interpreting complex information for agents (Kawasaki, 1994). As a result, specialists are key individuals in providing the technical information that drives county extension programming (Warner and Christenson, 1984; and Prawl, Medlin, and Gross, 1984).

Several studies reveal that extension specialists are one of the primary sources of information for county agents (Radhakrishna and Thompson, 1996 and Shih & Evans, 1991). Specialists represent the most highly specialized segment of the professional staff (Baker and Vallalobos, 1997). According to Vines and Anderson (1976), approximately 44% of the total personnel in extension are specialists typically located in academic departments along with teaching and research faculty. Gibson and Hillison (1994) suggest that effective specialists must understand the extension education process. In addition, they must understand the human development, learning, and social interaction processes, and they must become knowledgeable about the organization within which they work (Gibson and Hillison, 1994 and Baker and Vallalobos, 1997).

Woeste and Stephens (1996) provide an excellent description of extension specialist's roles and responsibilities. They identify three major responsibilities--synthesis of research, leadership, and scholarship (Figure 1). Within each of the three major responsibilities, they identified several specific roles and duties for extension specialists. These include: 1) staying current with the up-to-date latest research and technologies, 2) providing leadership for development, implementation, and evaluation of new initiatives, 3) understanding concerns of clientele, 4) synthesizing and integrating research information and expertise into educational programming materials, 5) creating awareness among county faculty regarding new program initiatives, 6) providing technical subject matter assistance to county staff in the conduct of extension programs, 7) identifying funding sources to further the effectiveness of extension, 8) providing feedback to departmental faculty and program leaders on program needs, 9) encouraging the involvement and participation of other university faculty, community, and industry experts in the development and implementation of educational programs, and 10) participating in disciplinary and professional activities.

In recent years, several issues have impacted the roles and responsibilities of extension specialists. These include budget reductions, dual appointments in research and extension, personnel turnover, increased workloads, and rapidly changing expectations of a more diverse clientele (Bartholomew, 1993; Gibson and Hillison, 1994; Feller, 1984; and Djire and Newman, 1995). According to Bartholomew (1993) and Gibson and Hillison (1994), budget reductions have negatively impacted the manner in which specialists perform their roles, resulting in ambiguous responsibilities and roles and cause disagreement as to the specific jobs of staff members. Dual appointments in research and extension has increased the uncertainty surrounding the roles and responsibilities of specialists (Feller, 1984). Faculty must have a clear perception of what is expected of them in extension (Baker and Villalobos, 1997). Djire and Newman (1995) contend that extension professionals have been faced with increased workloads as they strive to effectively meet the rapidly changing expectations of a more diverse clientele.

Baker and Villalobos (1997) conducted a study to determine the professional needs of Florida extension specialists as perceived by county faculty. Three professional development need constructs were examined--research generation and synthesis, program development and evaluation and communication and presentations. Findings from the study revealed six critical professional development needs for state specialists which included: 1) the ability of specialists to collaborate with county faculty in conducting demonstrations, 2) the ability to understand the needs of clientele, 3) the ability to provide appropriate educational program materials, 4) the ability to offer appropriate inservice training programs to county staff, 5) the ability to evaluate state major programs, and 6) the ability to travel to counties at state expense. Further, Baker and Villalobos concluded that personnel development involves all activities aimed at improvement and growth in an individual's ability to perform assignments effectively. As indicated by Castetter (1981) and Carroll (1989), professional development needs must be continuously assessed in order to provide meaningful staff development programs.

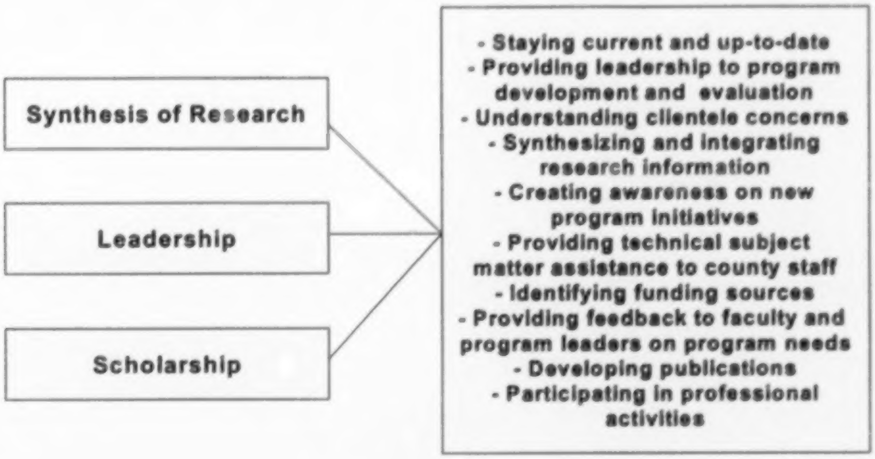
Synthesis of Research
Leadership
Scholarship
- Staying current and up-to-date
- Providing leadership to program development and evaluation
- Understanding clientele concerns
- Synthesizing and integrating research information
- Creating awareness on new program initiatives
- Providing technical subject matter assistance to county staff
- Identifying funding sources
- Providing feedback to faculty and program leaders on program needs
- Developing publications
- Participating in professional activities

Figure 1: Extension Specialist's Roles and Responsibilities (Source: Woeste and Stephens (1996)

Purpose and Objectives

The overall purpose of this study was to identify and prioritize the professional development needs of extension specialists in the Clemson University Cooperative Extension Service. Specific objectives of the study were to:

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1. describe the demographic profile of extension specialists.
2. identify and prioritize the professional development needs of extension specialists in the areas of program development and evaluation, research generation and synthesis, and communication and presentation.

Methods and Procedures

The population for this study consisted of all 78 Extension specialists employed by the Clemson University Cooperative Extension Service. The frame was obtained from the personnel office.

An instrument was developed based on a study conducted by Baker and Villalobos (1997). The instrument had four sections. Section one contained 15 statements relative to program development and evaluation. Section two contained five statements on research generation and synthesis, while section three contained 10 statements on communication and presentation. Respondents were asked to rate, using a five-point Likert scale (one being low, two being below average, three being average, four being above average, and five being high), the importance they place on each statement and the degree to which they possessed the ability. Section four contained demographic information such as gender, educational level, major area of study, primary area of responsibility and years of service in extension.

The instrument was validated for content and face validity by a panel of four experts which included the Director of Extension, two faculty members in the Department of Agricultural Education and an inservice training coordinator. A cover letter and a copy of the instrument were mailed to all the specialists in April of 1999. After the initial mailing and two follow-ups (sending another copy of the survey and electronic messages), a total of 47 specialists responded for a return rate of 60 percent. Early and late respondents were compared on variables identified in sections one through three as per procedures suggested by Miller and Smith (1983). No significant differences were found between early and late respondents. A post-hoc reliability analysis indicated that the instrument had "excellent" reliability. Alpha coefficients ranged from a low of 0.74 to a high of 0.87 with an overall of 0.93 (Table 1).

Data were analyzed using descriptive statistics such as frequencies, percentages, means, and standard deviations. Data were analyzed using the SPSS/PC+ statistical program for Windows. Matrix analysis recommended by Hershkowitz (1973) and Witkin (1984) were used to determine critical professional development needs of extension specialists. The following procedures were used. First, composite means for importance and current ability were calculated for each of the three areas--program development and evaluation, research synthesis and generation, and communications and presentations. Second, the composite means were plotted on a "X" and "Y" axis of a graph resulting in the creation of four quadrants. Third, mean importance and current abilities for each statement within each area were plotted on the graph. As a result of this procedure, the four quadrants were labeled as 1) High level successful abilities--HLSA (high levels of importance and ability), 2) Low level success abilities--LLSA (low levels of importance and high levels of ability), 3) Low level needs--LLN (low levels of importance and ability), and 4) Critical needs--CN (high levels of importance and low levels of ability).

Table 1: Cronbach's Alpha for Three Professional Development Areas

Area	No. of Cases	No. of Items	Alpha
Program Development and Evaluation	44	15	0.86
Research Generation and Synthesis	46	5	0.74
Communication and Presentation	46	10	0.87
Overall	44	30	0.93

Results

Objective 1: Demographic Profile

The demographic profile of extension specialists are shown in Table 1. A majority of the specialists were male (74%). Sixty-eight percent of the specialists reported doctorate degree as their highest education level, followed by master's degree (28%), and bachelor's (4%). Agronomy/horticulture was the primary area of program responsibility for 18 specialists (39%), 4-H youth development for six specialists (13%), family and consumer science for six specialists (11%), forestry/natural resources for six specialists (11%), dairy and animal science for four specialists (8%), community development/leadership for one specialist (2%), and other (food science, leadership and administration) for seven specialists (15%). Specialists averaged 14.07 years of extension experience, with a low of 1 year to a high of 28 years.

Objective 2: Professional Development Needs

Table 3 shows the perceived level of importance and current ability placed by extension specialists toward 15 statements on program development and evaluation. The matrix analysis resulted in categorization of one statement as a critical need (CN), and seven statements as low level needs (LLN) and seven statements as high level success abilities (HLSA). The statement, ability to communicate program impact to decision makers was identified as a critical need. The seven low level needs identified were: 1) conducting needs assessments, 2) evaluating major initiatives, 3) interacting with national industry groups, 4) interacting with international industry groups, 5) identifying funding sources for program development, 6) assisting county faculty to obtain funds and 7) developing collaborative relationships with agencies at the county level.

Table 2. Demographic Profile of Extension Specialists

Characteristic	Frequency	Percent/Mean
Gender		
Male	34	73.9
Female	12	26.1
Total	46	100.0
Education Level		
Bachelors	2	4.2
Masters	13	27.7
Doctorate	32	68.1
Total	47	100.0
Primary Area of Program Responsibility		
Agronomy/Horticulture	18	39.1
4-H Youth Development	6	13.0
Family and Consumer Science	5	10.9
Forestry/Natural Resources	5	10.9
Dairy and Animal Science	4	8.7
Community Development/Leadership	1	2.2
Other	7	15.2
Total	46	100.0
Work Experience	46	14.07 yrs.

Two critical needs emerged in the research generation and synthesis area. The ability to communicate client problems to researchers and the ability to view problems from different perspectives were identified as critical needs--CN (Table 4). In addition, the following low level need (LLN) was also identified--ability to collaborate with county staff in conducting demonstrations.

Regarding communication and presentation, the matrix analysis did not reveal any critical needs (Table 5). However, three statements were in the low level need (LLN) category and seven statements in the high level successful abilities category (HLSA).

Table 3: Means and Standard Deviations for Perceived Importance and Current Ability for Program Development and Evaluation

	Importance*			Current Ability*			Need
Statement	n	Mean	SD	n	Mean	SD	Group**
Understand needs of clients	46	4.72	0.62	46	3.93	0.99	HLSA
Deliver extension programs	46	4.63	0.85	46	4.15	0.98	HLSA
Develop strategies to solve problems 45	4.49		0.69	45	3.86	0.73	HLSA
Produce appropriate educational programming materials	46	4.48	0.72	46	4.04	0.84	HLSA
Develop appropriate inservice training to county staff	46	4.41	0.86	46	4.06	0.99	HLSA
Assist county staff in planning programs	46	4.00	0.94	46	3.87	1.08	HLSA
Interact with state-wide industry groups	46	4.26	0.88	46	3.78	1.03	HLSA
Communicate program impact to key decision makers	**46**	**4.22**	**0.96**	**46**	**3.04**	**0.89**	**CN**
Conduct needs assessment to determine program direction	46	3.98	1.02	46	3.28	1.00	LLN
Evaluate major initiatives	46	3.95	1.05	46	3.09	1.07	LLN
Interact with national industry groups	46	3.82	0.99	46	3.41	0.96	LLN
Identify funding sources for program development	46	3.78	1.11	46	3.26	1.08	LLN
Develop collaborative relationships with agencies at the county level	44	3.43	0.99	44	3.02	1.04	LLN
Interact with international industry groups	45	2.78	1.14	45	2.44	1.01	LLN
Assist county faculty in obtaining funding	46	2.76	1.14	46	2.56	1.13	LLN
Composite mean	**46**	**3.96**	**0.91**	**46**	**3.45**	**0.99**	

*Mean Importance and Ability computed on a scale: 1 'Low' to 5 'High'
**Needs categorized by Quadrant analysis: CN=Critical Need; LLN=Low Level Need; HLSA=High Level Sustainable Ability; and LLSA=Low Level Successful Ability

Table 4: Means and Standard Deviations for Perceived Importance and Current Ability for Research Generation and Synthesis

	Importance*			Current Ability*			Need**
Statement	n	Mean	SD	n	Mean	SD	Group
Knowledge of current research findings	46	4.41	0.68	46	3.80	0.86	HLSA
Communicate client problems to researchers	**45**	**4.31**	**0.73**	**45**	**3.67**	**0.93**	**CN**
View problems from different perspectives	**46**	**4.13**	**0.83**	**46**	**3.59**	**1.00**	**CN**
Conduct applied research	46	4.06	0.99	46	3.80	1.02	HLSA
Collaborate with county staff in conducting demonstrations	46	3.76	1.04	46	3.60	0.95	LLN
Composite mean	**46**	**4.13**	**0.91**	**46**	**3.69**	**1.01**	

*Mean Importance and Ability computed on a scale: 1 'Low' to 5 'High'

**Needs categorized by Quadrant analysis: CN=Critical Need; LLN=Low Level Need; HLSA=High Level Sustainable Ability; and LLSA=Low Level Successful Ability

Table 5: Means and Standard Deviations for Perceived Importance and Current Ability for Communication and Presentation

	Importance*			Current Ability*			Need**
Statement	n	Mean	SD	n	Mean	SD	Group
Listening skills	46	4.69	0.63	46	3.96	0.89	HLSA
Communicate orally	46	4.63	0.61	46	4.39	0.77	HLSA
Demonstrate enthusiasm when delivering programs	46	4.63	0.77	46	4.22	1.00	HLSA
Respond to technical subject matter questions in a timely manner	46	4.59	0.75	46	3.98	0.88	HLSA
Communicate with county faculty via e-mail	46	4.50	0.72	46	4.30	0.86	HLSA
Communicate in writing	46	4.46	0.69	46	4.13	0.72	HLSA
Incorporate prior experiences when delivering programs	46	4.35	0.71	46	4.30	0.81	HLSA
Assist county staff to incorporate innovative teaching techniques into programs	46	3.98	0.93	46	3.63	0.93	LLN
Develop educational materials on electronic databases for county staff	45	3.93	1.16	45	3.33	1.11	LLN
Provide research summaries suitable for counties	46	3.89	0.75	46	3.48	0.94	LLN
Composite mean	**46**	**4.36**	**0.87**	**46**	**3.97**	**0.96**	

*Mean Importance and Ability computed on a scale: 1 'Low' to 5 'High'

**Needs categorized by Quadrant analysis: CN=Critical Need; LLN=Low Level Need; HLSA=High Level Sustainable Ability; and LLSA=Low Level Successful Ability

Overall, the matrix analysis yielded three critical needs (CN), eleven low level needs (LLN), one low level sustainable abilities (LLSA), and 15 high level successful abilities (HLSA).

Conclusions and Recommendations

The following conclusions and recommendations were made based on the findings of the study:

Extension specialists perceive themselves as possessing a high level of competence in nearly half of the professional development needs examined in this study. This finding confirms a high degree of importance and ability of specialists in developing and implementing extension programs. This conclusion supports previous research conducted by Baker and Villalobos (1997).

Based on the results of the quadrant analysis, three critical needs (CN) were identified. Two of the critical needs--communicating client problems to researchers and viewing problems from different perspectives--were in the research generation and synthesis area while the other--communicating program impact to key decision makers-- was in the program development and evaluation area.

Extension specialists need to step up their efforts to communicate client problems to researchers so that appropriate extension programs and/or solutions can be offered. Two aspects need emphasis in light of this finding. First, good communication between agents, specialists, and research faculty should be emphasized. Second, a communication network and/or information resource group should be developed. The recent requirement of integrating research and extension plans of work under the AREERA (Agricultural Research Education Extension Reforms Act, 1998) may further strengthen the linkage between research and extension programs and activities.

Communicating impact of extension programs to key decision makers has become increasingly important because of the emphasis placed by federal and state governments on documenting impact. Specialists need to develop skills in documenting not only program impact, but also in communicating them to their stakeholders. In future, the need for showing and communicating program impact will increase tremendously because of linking program success to funding (performance-based budgeting). Therefore, it is recommended that inservice training on how to assess and communicate program impact to stakeholders be developed and offered. Such inservice training should be based on key program areas of specialists and agents.

Extension specialists also perceived a low level need in 11 professional development topics. Many specialists have been involved in extension programming both at the county and state level. For example, specialists in this study reported an average work experience of 14 years, and as such they may have perceived a low level (LLN) need for training in these topics. A closer examination of these 11 topics reveal a need for professional development training in program evaluation, conducting needs assessments, developing educational materials suitable for electronic databases, interacting with regional, national and international industry groups, and identifying funding sources for county staff. As indicated by Witkin (1984), low level needs should be given importance and reinforced on a regular basis. It is recommended that these topics be given priority in offering future training programs for specialists.

Finally, two things need to be addressed as a result of this study. First, need for professional development training in the areas identified as critical should be given top priority. Second, the findings may also suggest justification for a closer look at reprioritization of specialists roles and responsibilities.

The following recommendations are offered for further study and/or administrative actions:

1. Further research should be conducted involving county faculty--county extension directors and county agents-- relative to the professional development needs of specialists. Findings of such research should help develop a comprehensive professional development program for all extension personnel.

2. It is recommended that a Professional Development Task Force be appointed to address issues relative to professional development activities. The Task Force should take into account factors such as hiring practices, staff turnover, professional experience and academic preparation of new and current employees. The establishment of such a Task Force is essential for effective development, delivery, and evaluation of extension programs.

3. It is recommended that a summary of findings be shared with extension specialists, county staff, and administrators to provide insight and direction to future inservice offerings and professional development activities.

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Professional Development Needs of State Extension Specialists

A Critique

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Professional growth continues to be one of the most important elements of career development. The author is to be commended for constructing a study focused on professional development. The literature review established the key issues involved in the professional development of Extension Specialists. The diagram helped clarify the major concerns and basis for the study.

While the study may not have resulted in anything new being revealed, the results do emphasize three areas of major concern today in land-grant universities: impact, communication of client problems and views about problems. Given public policy makers' needs for information for quality decision-making, these are contemporary needs and indicates a sense of awareness of current problems. I was surprised that the item on obtaining funding rated low in importance, especially because finding funding is becoming one of the major issues in Extension. Are these people really in touch with major issues?

There are some concerns regarding this study that deserve some mention. These concerns are identified here in the form of questions that we need to consider in the discussion of this study's results and implications.

1. This study is based on self-reported data. How much faith should we have in the data indicating what is really true? Wouldn't data from people impacted by these specialists be more convincing? One of the conclusions seems to indicate this concern.
2. Why establish a Task Force when this study has isolated 3 major concerns to be addressed and identified several high priority areas? Does this mean you don't trust the results of the study? The 3 major areas of concern represent critical needs. It seems emphasis on them would keep trainers very busy.
3. The return rate seemed low for the size of the population. Are you convinced you did enough to gain a higher return rate? Were these Extension Specialists convinced that these issues merited the time it took to respond to the survey?

Professional development is a worthy area of study. The question is who do we ask for input regarding this research area? Stakeholders and those most impacted by these professionals play a key role in improving services. While the results of this study are useful to a limited extent, the continual study of professional development skills and knowledge is required if there is to be real impact on inservice education.

The Influence of Selected Personological and Organizational Characteristics Upon Professional Development Needs of State Extension Specialists in Florida

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This current study completes a three-phase process to determine critical professional development needs of the University of Florida Extension (UFE) state specialists. Phase I data were collected from county directors, Phase II from county faculty, while this phase involved data collected from state extension specialists themselves. In addition to identifying critical professional development needs using the matrix analysis method, the researchers also examined differences in those needs based upon age, percentage of extension appointment, years of professional experience, academic rank, and program typology. This study revealed three critical professional development needs ("knowledge of current research findings", "ability to identify funding sources for program development", and "ability to incorporate appropriate instructional techniques in my own presentations"). UFE specialists differed based upon professional development needs on only one of the personological characteristics (gender) and on none of the organizational variables. Individuals planning professional development programs should keep in mind that these critical professional development needs cut across most of the personological and all of the organizational characteristics included in this study.

Introduction and Theoretical Framework

Professional development is a planned experience designed to change behavior and result in professional and/or personal growth and improved organizational effectiveness (Bryan & Schwartz, 1998). Professional development can take the form of in-service training, professional organizations, personal reading, computer networks, and mentoring programs.

The process of professional development encompasses informal, non-formal and formal approaches to improve the effectiveness of personnel. First, the informal approach to professional development is a learning process that includes observing and mentoring activities that are associated with the organization. Second, the non-formal approach is any organized, systematic, and educational activity carried outside the framework of the formal setting to provide selected types of learning to a particular subject. Third, the formal approach to professional development is an active, intentional training or education in a defined period (Bryan & Schwartz, 1998).

In 1999, Baron and Kreps proposed a theoretical model of both internal and external factors affecting professional development. They suggested that the external factors can be divided into four categories: (1) social, pertaining to the society norms about employment: (2) political, in terms of impediments imposed by the political system; (3) legal, concerning the rights of the employee, and (4) economic, concerning budgets and labor market. The organizational setting, employees, trainers, and managers are classified as internal factors that influence employee development. This current study will focus upon organizational and employee-related factors influencing the professional development needs of state extension specialists.

According to Castetter (1992), the organizational structure is a design that identifies type of positions, functions to be performed, reporting relationships, administrative authority, power and responsibilities. The organizational structure determines the effectiveness of personnel.

Financial resources are needed for pre-planning and professional development program delivery. During the pre-program phase, costs related to problem analysis, process analysis to identify the what's and how's of the program as well as learning objectives are considered. Resources must also be available for developing and approving the professional development conceptual plan (Stillwagon, 1996). Program development costs are related to developing the program presentation as it relates to administrative labor and support material, costs of delivery, facilities, and costs associated with follow-ups (Stillwagon, 1996; Noe, 1999).

Organizational policies and practices to maintain or upgrade professional competencies should: (1) enhance access to new information by increasing opportunities for professionals to communicate among them on new developments, such as new technical information; (2) provide opportunities and encouragement for continuing education and career development to stimulate professional competence; (3) expand the professionals' responsibilities and autonomy by increasing their influence in the decision making process; and (4) use a meaningful rewards system to motivate professionals to maintain up-to-date knowledge and skills (Kaufman, 1990).

Knowles (1996) suggested that in any learning process the adults as learners have a need to know why they should learn something. Adults also have a deep need to be self-directed as well as being in-charge of their own life. Adults also are responsible for decision-making and are capable of living with the consequences of their actions. He argued that adults have a greater volume and different quality of experiences than youth. He also posited that adults become ready to learn when they experience a need to know or be able to do in order to perform more effectively and satisfyingly. Adults enter into a learning experience with a problem-centered orientation to learning, and are motivated to learn by both extrinsic motivators in the form of salary raises, promotion, satisfaction, and intrinsic motivators as a need of self-esteem, power and achievement (Knowles, 1996; Webb, Montello, & Norton, 1994).

Additionally, employee learning styles, that is the way a person behaves, feels, and processes information in learning situations, are important elements to consider in professional development. Stephen (1987) indicated the need to assess learner's strengths and weakness to match learning strategies and resources to better accomplish educational goals.

Baker, Hoover, and Rudd (1998) used the Group Embedded Figure Test (GEFT) to assess the learning styles of extension professionals in Florida. The GEFT divides learners into two distinct learning styles. First, field dependent learners have global perceptions, are sensitive to their social environments, have highly developed social skills, favor a spectator approach to learning, and need a structured learning environment. Second, field independent learners are relatively uninfluenced by their surroundings, are perceptive of discrete parts, have good analytical capabilities, and often provide their own structure to facilitate learning. In this regard Baker et al. (1998) suggested that it is essential that professional development programs for extension professionals be highly structured and allow for social interaction.

Seevers, Graham, Gamon, & Conklin (1997) pointed out that professionals in extension organizations obtain skills and satisfy needs of the profession by acquiring pre-service training through bachelor's and graduate programs, conferred by an accredited institution. State extension specialists in the U.S. land grant system provide leadership to national, regional and statewide programming initiatives and support county faculty as they implement these initiatives. They typically hold dual appointments in extension, and either in academic programs through a College of Agriculture or research through an agricultural experiment station. Thus state specialists are extension professionals with expertise in a particular subject area, who have the responsibility to translate and disseminate research-based material (Waddill & Woeste, 1996).

Generally state specialists are educated within a technical discipline and are employed only after obtaining a Ph.D. After they are employed they have professional development opportunities through UFE and through their involvement in technical professional associations and often special interest groups in extension.

As a response to the trends in extension programming, UFE created a Task Force with specific goals regarding the organization and function of a professional development program (PDP). The purpose of the professional development program is to provide initial and advanced professional development experiences for county and state faculty, and administrators, based upon their position, programmatic responsibilities, tenure and individual needs as determined through self-assessment and administrative guidance (App, Grace, Hoover, Jacob, Osborne, Torres, Vergot & Williams, 1998). The goals were to: (1) assess the professional development needs of new and existing county and state faculty, (2) provide orientation and training for new county and state faculty, including delivery methods, (3) monitor ongoing professional development for county and state faculty, and (4) examine and change as needed the current procedures of professional development offerings. The PDP will assess and address the professional development needs for extension personnel involved at various levels of the organization: (1) county faculty, (2) state specialists, (3) department chairs, (4) center directors, and (5) extension administrators.

Since few studies have been conducted in relation to the competencies and professional development needs of specialists in the extension system, this study will increase the broad knowledge of the field. This additional information will provide a foundation for adjusting the roles of these professionals consistent with mission, goals, and objectives of UFE.

This study serves as the final phase of a triangular process. In Phase I, Baker and Villalobos (1997) surveyed county directors to appraise the professional development needs of state specialists. In Phase II by Allen (1999), the professional development needs of specialists were assessed based upon the perception of county faculty (excluding county directors). The current research identifies the professional development needs of state specialists based upon their own perceptions.

The results of the study will provide important information as UFE positions itself as an integral component of the University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) strategic planning process known as *Florida First*. Furthermore, the results can provide the organization with tools to improve the evaluation and accountability of extension programs and the overall performance of its professionals, taking into consideration their incumbent duties as teachers, facilitators, researchers, negotiators, and extension professionals.

Purpose and Objectives

The purpose of the study was to determine the professional development needs of state specialists within UFE. The objectives of the study were to: (1) identify the critical professional development needs of state specialists; (2) determine the amount of variance in the perceived importance and possession of the attributes of: (a) general knowledge; (b) program development and evaluation; and (c) communication and presentation as explained by a linear combination of the state specialists' age, percentage of extension appointment and years of UFE service; and (3) determine if significant differences existed between the attributes in: (a) general knowledge; (b) program development and evaluation; and (c) communication and presentation based upon gender, specialist academic rank, and program typology.

Methodology

The population (N=220) of the study consisted of extension specialists in UFE holding a Ph.D. degree. A stratified random sample size of 140 was selected for data collection purposes (Krejcie & Morgan, 1970). This sample size provided a margin of error of plus and/or minus 5%. The sample stratification was made using the department in which the specialist was affiliated as strata.

Baker and Villalobos (1997) initially developed the instrument after an extensive literature review and utilizing feedback from a panel of experts that assessed content validity. The instrument consisted of 28 Likert-type statements. Cronbach's alpha reliability coefficient reported for the constructs ranged from r=0.80 to r=0.82, based upon a field test of the instrument prior to data collection.

Allen (1999) went through the instrumentation process of establishing content validity and reliability. After a review by a panel of experts, one item was added to the program development and evaluation construct (Ability to Provide Design Team Leadership), and one item was omitted from the communication and presentation construct (Ability to Travel at State Expense). The field test for reliability yielded Cronbach's alpha reliability coefficient from r=0.60 to r=0.92.

In an effort to control for measurement error for the current study, the instrument was submitted to a panel of experts comprised of extension administrators, extension specialists and district directors, which re-established its content and face validity. In order to determine the internal consistency of the instrument, sixteen specialists who were not selected in the sample were randomly chosen to field test the instrument. Reliability coefficients ranged from r=.73 to r=.91.

The second part of the instrument collected demographic information. Questions of age, gender, academic rank, years of service at the University of Florida, and program typology were included in this section. The first mailing was on March 29th, 1999 to the 140 specialists that composed the sample resulting in 66 questionnaires completed and returned (47.1% return rate).

A second mailing was sent to the non-respondents on April 19th, 1999. From the second mailing, 31 additional completed questionnaires were received while seven potential respondents did not categorize themselves as specialists and asked to be removed from the study. A final attempt was made by the researcher to complete the data collection process. Between May 10th to 15th, the researcher personally delivered the instrument to fifteen specialists and received twelve completed questionnaires. A total of 102 questionnaires were completed and returned (72.8% return rate).

One of the errors associated with survey research is non-response error (Ary, Jacob, & Razavieh, 1996). Research has shown that non-respondents are often similar to late respondents. As recommended by Goldhor (1974), to control for non-response error, respondents were categorized into early and late groups. Subsequently their responses were compared to check for any significant differences, and if no significant differences are found between early and late respondents, late respondents are believed to be typical of non-respondents, allowing the researcher to assume that respondents are an unbiased sample, thus generalizable to the population. Results of the t-tests showed no significant differences between the early and late respondents based upon the demographic variables.

To maximize the representation of the population, sixteen questionnaires from the field test were added to the sample resulting in 118 usable questionnaires. The procedure was implemented after the results of another round of t-tests showed no significant differences between the two groups based upon the demographic variables.

Data were analyzed using the SPSS/PC for Windows (Version 9.0). Critical needs were determined based upon the use of a matrix analysis as recommended by Witkin (1984) for assessing needs in education and social programs. This analysis produces graphic displays, which are helpful to individuals and groups making recommendations about priorities. Additionally, the matrix analysis method can be used not only for abilities rating and subsequently identification of critical needs, but also for organizations making decision about allocation of resources (Witkin, 1984).

Means of attribute importance, and the degree to which they possess the ability, were calculated for each construct separately. The attribute means were then used to construct a XY graph plotting the degree of possession of each attribute on the "X" axis and the overall importance of each attribute on the "Y" axis. After plotting both grand means (GM) for each (attribute importance and attribute process) construct, four quadrants emerged. For example, if an item score mean for overall importance is greater than the construct grand mean, and the mean for possession is less than the construct grand mean, the item would be placed in the critical need quadrant.

For the second objective, simultaneous entry linear regression analysis was performed to determine the amount of variance in the perceived overall importance and degree of possession of the attributes in general knowledge, program development and evaluation, and communication and presentation as explained by linear combination of specialists' age, length of service and appointment time. Grand means for both overall importance and possession of the abilities were used as dependent variables, and specialists' age, length of service at UF and appointment time were used as independent variables (predictors). An alpha level of 0.05 was established a priori.

The final objective was to determine if there were differences between the attributes of overall importance and the possession of general knowledge, program development and evaluation, and communication and presentation based upon the specialists' gender, academic rank, and program typology. Program typology was established by dividing departmental affiliation into two groups (applied behavioral sciences and natural sciences). Specialists in the Departments of Agricultural Education and Communication, Food and Resource and Economics, and Family, Youth and Community Sciences were assigned into the applied behavioral sciences group. The second group consisted of specialists in the Departments of Agricultural and Biological Engineering, Agronomy, Animal Science, Dairy and Poultry Sciences, Entomology and Nematology, Food Science and Human Nutrition, Environmental Horticulture, Fisheries and Aquatic Sciences, Horticultural Sciences, Large Animal, Plant Pathology, Wildlife Ecology and Conservation, Soil and Water Sciences, and the School of Forest Resources and Conservation. One-way analysis of variance was performed using the grand means of both importance and possession as dependent variables, and gender, academic rank and program typology as independent variables. An alpha level of 0.05 was established a priori. When significant differences was found a subsequent analysis of variance was performed for each singular item of the construct to identify which items in the construct were generating the differences.

Results

Using the matrix analysis recommended by Witkin (1984), the researcher classified each item in the construct as being a critical need, low-level need, high-level successful ability or low-level successful ability. In the general knowledge area the only critical need was "knowledge of current research findings." Low -level needs included: (1) "ability to incorporate research into my extension program plan", (2) "ability to collaborate with county faculty in conducting result demonstrations", and (3) "ability to view problems from a systems perspective."

In the area of program development and evaluation, only one critical need was identified. The critical need was in regard to their "ability to identify funding sources for program development". The following low-level needs were identified by specialists: (1) "ability to assist county faculty to plan programs"; (2) " ability to assist county faculty in obtaining funding"; (3) "ability to interact with international industry groups/agencies or organizations"; (4) "ability to evaluate state major programs"; (5) "ability to provide design team leadership"; and (6) "ability to develop and follow an annual and long range plan for my extension program."

One critical professional development need surfaced in the communication and presentation construct. The critical need was the "ability to incorporate appropriate instructional techniques in my own presentation". The following six items were identified as low-level professional development needs: (1) "ability to assist county faculty to incorporate instructional techniques into programs (more than simply lecturing)"; (2) "ability to provide research summaries for county newsletters"; (3)" ability to develop products on electronic data bases for county faculty "; (4) "ability to work with news media"; and (5) "ability to resolve/manage conflicts between client groups and issues".

The second research objective was to determine the amount of variance in the perceived importance and possession of the attributes of: (a) general knowledge; (b) program development and evaluation; and (c) communication and presentation, as explained by a linear combination of the state specialists' age, percentage of extension appointment, and years of UFE service.

The average state specialist has been employed at the University of Florida for 16.36 years (SD= 8.92). Furthermore, 49% of the state specialists had a length of service ranging from 11 to 20 years. The average age of state specialists was 50 years (SD=8.29). On average the state specialists had 55% extension appointments (SD=9.0). The appointments ranged from 10 % to 100%. None of the six regression models were statistically significant which reveals that these demographic and organizational factors had little influence upon the professional development needs of the state specialists.

The final research objective was to determine if significant differences existed between the attributes in: (a) general knowledge; (b) program development and evaluation; and (c) communication and presentation based upon gender, specialist academic rank, and program typology. About 87% of the specialists in the sample were males.

No statistically significant differences (F=1.440, p=0.233) were found between males (M=4.36, SD=0.45) and females (M=4.5, SD=0.29) in overall perceived attribute importance of general knowledge. In addition, no gender differences were found based upon current abilities of general knowledge possessed by specialists (F= 0.987, p=0.323).

Females (M=4.41, SD=0.29) perceived program development and evaluation as being more important (F=9.49, p=0.003) than males (M=4.01, SD=0.49). Females (M=4.07, SD=0.54) perceived themselves as possessing significantly (F=4.77, p=0.031) greater program development and evaluation abilities than did males (M=3.69, SD=0.62).

Significant differences were found between male specialists (M=4.23, SD=0.49) and female specialists (M=4.5, SD=0.33), on the perceived importance of communication and presentation abilities (F=5.098, p=0.026). However, there were no significant differences between male specialists (M=3.96, SD=0.51) and female specialists (M=4.15, SD=0.42) on communication and presentation abilities possessed by state specialists (F=1.714, p=0.193).

On three of the six analyses of variance, a significant gender effect was found. The three analysis were in: (1) overall importance of program development and evaluation; (2) current abilities of program development and evaluation; and (3) overall importance of communication and presentation. In an effort to better understand the nature of these differences, an item-by-item construct analyses was conducted with gender as the independent variable. In terms of overall importance of program development and evaluation significant differences were found on five items. The five items were: (1) "ability to assist county faculty to plan programs"; (2) "ability to produce educational programming materials"; (3) "ability to evaluate state major programs"; (4) "ability to develop and follow an annual and long range plan for my extension program"; and (5) "ability to collaborate with other state specialists in planning and delivering programs". It should be noted that for all five items, females perceived them to be more important than males.

In terms of current abilities of program development and evaluation, significant differences were found in two items: (1) "ability to produce educational programming materials"; and (2) "ability to develop and follow an annual and long range plan for my extension plan". Females perceived themselves as possessing greater abilities than males.

In the communication and presentation construct, five items showed significant differences. The five items were: (1) "ability to communicate in writing"; (2) " ability to respond clearly to technical subject matter questions in a timely manner"; (3) "ability to assist county faculty to incorporate instructional techniques into programs, more than simply lecture"; (4) "ability to exhibit enthusiasm when delivering programs"; and (5) "ability to incorporate appropriate instructional techniques in my own presentation". Likewise, females perceived the items more important than males.

Most of the state specialists held the rank of professor (57.6%), followed by associate professor (28%) and assistant professor (14.4%). Twenty two percent of the specialists could be classified as applied behavioral scientists, while the majority were classified as natural scientists (77.6%). None of the analyses, which examined the influence of academic rank and program typology upon professional development needs, were statistically significant.

Conclusions and Recommendations

One critical need was identified in the general knowledge construct: "knowledge of current research findings." This need is related to problems of time management. Finding the time to remain up-to-date with new research findings is a challenge of all academics. This finding is clearly contrasted with the perceptions of county directors (Baker & Villalobos, 1997) and county faculty (Allen, 1999). These two groups perceived that state specialists had a critical need in their "ability to collaborate with county faculty in conducting result demonstrations." In addition, county faculty identified a critical professional development need related to "communicating client problems to researchers."

In terms of program development and evaluation, specialists identified a critical need to be the "ability to identify funding sources for program development." Baker and Villalobos (1997) and Allen (1999) results agreed upon the following critical needs in this same construct: (1) "produce educational programming material"; (2) "deliver appropriate in-service training to county faculty"; and (3) "evaluate state major programs." In addition, county directors identified one more critical need: "understand needs of clients" (Baker & Villalobos, 1997).

The only critical professional development need in the communication and presentation construct was the "ability to incorporate appropriate instructional techniques in my presentation." County directors identified the critical need of "travel of specialists to county offices at state expense." County faculty indicated that specialists had a critical need regarding their ability to "listen to and respond to technical questions in a timely manner." It is important to note that in communication and presentation, the perception of critical needs differed in all three studies.

Generally, the results revealed that critical needs identified by specialists differed in all three construct areas, when compared to those identified by county faculty and county directors. It is also interesting to note that county faculty and county directors were relatively consistent regarding their expectations of specialists.

None of the six regression models were statistically significant which reveals that the demographic (specialists' age) and organizational factors (percentage of extension appointment, and years of UFE service) have little or no influence upon the perceived importance and current abilities of specialists in general knowledge, program development and evaluation, and communication and presentation. Specialists' academic rank and program typology did not generate significant differences between the attributes of general knowledge, program development and evaluation, and communication and presentation. These critical professional development needs cut across these demographic and organizational factors. In terms of planning professional development programs, the ability to generalize beyond age, appointment percentage, years of UFE service, academic rank, and program typology is considered a positive.

There were significant differences between male and female specialists for attributes of importance and possession of program development and evaluation, and attribute importance of communication. Generally, females gave more importance to certain items than males did. There are a number of plausible explanations for this finding. First, the female specialists in the sample may have had more exposure to social science course work, and/or practical experience in the field in working with extension audiences. An inspection of the sample of females resulted in no gender differences based upon program typology. However, there are specialists in the natural sciences that were educated as social scientists, and this may explain the gender difference. Second, female specialists may be more qualified than males. Certainly as a whole, state specialists are a male-dominated group. Finally, another explanation may be a result of gendered communication styles (Wahlstrom, 1989; Lee, 1997; Baker & Wilson, 1998). Valenti (1996) stated: "empirical studies in communications have repeatedly confirmed gender-based differences in ways of knowing and conversing, audience responses, leadership and consumer behaviors, decision making processes, and more (p. 42)."

Based upon these findings, there are a number of logical recommendations. First, the UFE professional development specialists should collect focus group data in an effort to verify these results and provide deeper insight into the critical needs that surfaced. These same individuals should then develop and beta test a positional analysis tool for specialists to use to identify personal strengths and deficiencies. In addition, the information that surfaces can be used in establishing program curricula in the three critical professional development need areas.

Second, the professional development specialists should examine organizational rewards associated with employee participation in professional development programs. Finally, there is a need for extension administrators, unit leaders, specialists, and county faculty to develop clear parameters as per the responsibility of state specialists.

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The Influence of Selected Personological and Organizational Characteristics Upon Professional Development Needs of State Extension Specialists in Florida

A Critique

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This paper focused on the third phase of a project focused on professional development needs of Extension Specialists. The authors established a clear basis for the study. They thoroughly explained their procedures and provided a framework for conducting the study. The authors are to be commended for focusing their study on this important topic in adult education. Professional development programs help sustain quality programming and it is an important component of Extension. However, the title of the paper seems a bit misleading as well as overpowering.

In reviewing this paper it seemed as if the Clemson study and the Florida study were cut from the same cloth. It was as if the researchers collaborated in conducting their individual studies, although there was no reference to this approach nor were the results the same. I am not sure what this means regarding Extension specialists at Florida and Clemson.

While the study did not reveal much new information, using matrix analysis the authors did find three critical need areas:

- knowledge of current research findings
- ability to identify funding sources
- ability to use appropriate instructional techniques

These findings seem to show needs that counter the needs in South Carolina, especially the one on funding.

Additionally, apart from a few differences between males and females regarding importance of various components in program development, little else was found to be significant in this study. The authors state that many studies have confirmed the gender differences they found. This was more of a confirming study than a study revealing new information.

Given the above observations, there remain some questions that need to be answered regarding this study:

- How much faith can we have in self-reported data on professional development needs? No cautionary notes were made in the paper indicating this weakness in such studies.
- What makes the recommendations "logical" as you state in the paper? Wouldn't it be more logical to compare this data with data gathered in the earlier phases of the project. No mention was made of this possibility or your plan to do so.
- How does the second recommendation relate to the findings? Does it really emanate from the data? If so, how and in what way?
- How could the data have been presented in the paper so it would have been more easily understood?

Professional development programming is a critical area of need. Researchers in this area of adult education need to be encouraged to pursue a greater understanding of the process of professional development.

Balancing Work and Family: Professional Development Needs of Extension Faculty

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Abstract

This study was designed to identify workplace and individual factors that cause stress in the lives of Extension professionals and to determine baseline needs assessment data for professional development in the area of balancing work and family. A census-survey questionnaire (74 percent response rate) was utilized to explore balancing work and personal life issues among the population of University of Florida Extension faculty. It was found that some faculty have stress under control while others are experiencing high levels of stress; county faculty perceived slightly higher stress than state faculty but this difference was not significant. Respondents reporting greater use of formal planning, planning for meetings, and 'to do' lists tended to have lower stress scores. Faculty who revealed higher levels of work addiction tended to report higher stress levels as well.

Most stress inducing situations disclosed in this study can be improved upon through proactive professional development. Training programs and inservices focusing on workday planning are needed to help faculty cope with the stress and pressure of an Extension career. For Extension faculty, spending more time with family served as a coping mechanism for minimizing stress also. Greater organizational effectiveness can be achieved through employees who are able to manage stress and work pressure via positive workplace skills.

Introduction/Theoretical Framework

Job stress, time management and balancing work and family are issues that educators in the field of Cooperative Extension constantly struggle with. An Extension career can be very rewarding personally and professionally, as well as very demanding. Extension educators are able to bring about tremendous positive impact among individuals and communities through locally provided education and information. Yet for many, an Extension career is known for long hours, travel, frequent night and weekend work, and working with the problems, issues and needs of others.

This is not a new problem for Extension. The demands and stress of Extension and its effect on people have been studied for several years (Fetsch and Pergola, 1991; Riggs and Beus, 1993; and Fetsch and Kennington, 1997). Each of these papers has served to document and reinforce the difficulties that Extension professionals have had with stress, burnout, depression, time management, and balancing personal/professional responsibilities.

The dilemma was recognized nationally by USDA-CSREES as early as 1981. As part of a national position paper regarding Cooperative Extension's role with strengthening American families, a national ECOP (Extension Committee on Organization and Policy) task force was also charged with examining the impact of stress and personal and professional balance within the Extension organization. The group determined that this was a critical issue, and as such, recommended that Extension's administrators needed to "critically examine their policies and practices and the resultant effects upon the family life of Extension employees" (ECOP Task Force, 1981, p.3).

Fetsch and Kennington (1997) have summarized a number of studies that had specifically addressed these concerns within Extension. They found that stress and burnout existed within Extension organizations in all of the states studied; some studies noted a direct relationship of Extension stress with family problems. The problem existed across all program areas with various levels of significance. They concluded that Extension professionals can attain overall improvement through the use of stress and time management strategies. Furthermore, they concluded that organizational policies and practices that lead to higher levels of stress must be modified and programs must be implemented for increasing coping skills and productivity of Extension professionals. These conclusions closely parallel recommendations made for other business areas (Abernathy, 1999; Hitchin, 1999; and Vincola, 1998).

Stress has been associated with mental tension and/or strain and is generally viewed as a nonspecific response of the body to a stimulus (Krannich et al., 1988). The subjective feeling of stress is derived from a stimulus (stressor) and from environmental demands (Krannich et al., 1988). Individuals have unique reactions to stressors due to differing modes of coping, mediation, and other adaptive capabilities.

Stress can manifest itself in physical outcomes. For example, stress has been shown to affect the immune, endocrine, digestive, and cardiovascular systems (Pearlin, 1989). Similarly, evidence suggests it also negatively impacts mental health (NMHA, 1988). Alcohol and drug abuse, domestic violence, neurosis, and depression are frequently cited as some of the more common psychological impacts of stressors (Pearlin, 1989).

Although there are many causes of stress, within the workplace there are three primary sources: the employee's personal life characteristics, the work conditions and environment, and situations occurring within the job itself (Kirkpatrick, 1996). Within the context of the organization, Kirkpatrick has identified seven categories that may be stress-inducing: competition for resources; task interdependence; jurisdictional ambiguity; status problems; communication barriers; individual traits; and miscellaneous factors such as role conflicts, volume of work, work schedules, insufficient authority, deadlines, organizational pettiness, and inadequate training.

Time management and work habits have been at the core of job stress and balancing personal and professional lives for quite some time. Studies conducted in the 1960s and 1970s documented that people's work efficiency declines after eight hours of work (Mackenzie, 1972). Unfortunately, many people get into a habit of "there is always tonight" for taking work home or staying late to get things done thereby stretching work beyond the normal workday. Other early studies have also shown that people who overemphasize their work at the expense of their family and marriage will eventually attain lower job performance (Mackenzie, 1972).

A more recent study conducted by the Franklin Covey Company denotes similar workplace problems. It was reported that 83 percent of Americans want to be more organized, 50 percent feel guilty about taking time off from work, and 62 percent often eat lunch while they continue work (Abernathy, 1999). People are trying to get more done (with work and family) in less time, which frequently leads to burnout and extreme frustration (Abernathy, 1999; Meikins, 1998; and Perlow, 1999). Meikins (1998) has found that some people feel extremely rushed and pressured at home, and as a result they may spend more time in the workplace, for escape and personal gratification, which only exacerbates the situation.

Coping and mediation are mechanisms that can serve to mediate the negative effects of stress. Coping is an individual action, but is learned from one's reference group (Pearlin, 1989). Mediators are essentially social supports that help alleviate or lessen stress (Pearlin, 1989). Most of the research on coping and mediation has been psychological in nature, with a clear emphasis on the individual. This body of research has shown that locus of control beliefs are critical to coping. If one believes that they have control of good and bad outcomes in their life (high locus of control), stress can be effectively reduced. Krause (1987) found that locus of control beliefs buffer stress to a limited extent, and that efforts at enhancing locus of control (empowerment) by individuals actually eroded such beliefs. Similarly, Mirowsky and Ross (1990) found that genuine control reduces stress, and most other coping methods are not as effective. Time management is generally seen as a means whereby individuals can control stress.

The issues of job stress, time management, and balancing one's personal and professional life is a significant dilemma in today's society and for Extension. These issues cause tremendous costs to organizations via employee medical problems, down time, sick days, job apathy, and lost productivity. For individuals this results in lowered wages, lessened job enthusiasm, depression, and familial difficulties. Extension must address these issues to attract and retain leading professionals for it to continue as a principal provider of nonformal educational programs.

Purposes/Objectives

The goal of this study was to identify workplace and individual factors that cause stress in the lives of Extension professionals. The study was designed for determining baseline needs assessment data for professional development in the area of balancing work and family. By identifying sources and personal characteristics that are associated with stress, professional development efforts can be directly targeted to address high priority issues in this area. To meet this goal, the study had two objectives: (a) to develop indices of stress and workplace habits, and (b) to develop a hierarchical block model that establishes the relative strength of work place skills, perspectives of work, and individual and family demographics in perceived stress levels.

Methods/Procedures

A census-survey questionnaire was developed to explore balancing work and personal life issues among the population of University of Florida Extension faculty. A panel of experts consisting of University of Florida faculty with Extension knowledge and/or experience was utilized for evaluation of content and face validity, and pilot testing. Suggested changes, clarifications, and improvements were subsequently incorporated into the instrument prior to its actual use.

In February of 2000, the questionnaire was mailed to 422 county and state Extension faculty. Following the total design method (Dillman, 1978), a postcard follow-up and a second mailing of the instrument was conducted in March. A third mailing was not initiated since the response rate was deemed adequate by the researchers at the completion of the second wave. There were 314 completed and usable questionnaires, for a 74 percent response rate. Subsequent data analysis showed no significant differences among early and late respondents.

Multiple linear regression with ordinary least squares (OLS) was employed for this analysis. OLS regression enables the modeling of the dependent variable as a function of the independent variables. Two models were utilized to determine the combined effect of each set of variables (work place skills, and individual and household demographics) on the dependent variable (stress). In the following analyses, the work place skills variables (workday planning, time pressure, and managing others) were entered in model one. In model two, seven individual and household demographic items were entered (age, income, gender, house work, time spent with family, working partner, and, state or county appointment).

Finally, the full model containing all of the defined independent variables was examined. This modeling strategy establishes the main effects of the variables in the blocks in relation to stress, while also controlling for all factors in the final model. Through the relative changes in adjusted R^2 the strength of these effects can be seen. Furthermore, changes in the beta coefficients and their associated statistical significance within blocks provide an informal check of the effects of multicolinearity. This is information that is difficult to determine from the full model presented later.

Results/Findings

Table One denotes selected demographic variables of the study respondents. An even number of males and females responded to the study, and this is parallel with the current makeup of University of Florida Extension faculty. The majority were married (78.4%), and most (82.0%) of their spouses/partners also worked. Total household income was well distributed, and averaged between $60,000 to $70,000 per household. Most of the respondents consisted of county faculty (71.8%) as compared to state faculty (24.8%). Average faculty age was 46 years. On average, respondents felt that they spent about 30 hours per week with their family.

The dependent variable for this study was an overall stress index score derived from a summation of eight items as measured via a five point Likert-type scale. The eight items included:

1) My life is filled with stress.
2) At the end of most days, I feel frustrated because I did not accomplish all that I planned to do.
3) I find myself trying to be everything to everybody.
4) My physical health is affected by stress in my life.
5) My life is a series of crises.
6) I have difficulty setting aside time for desired activities with my family or partner.
7) I feel overwhelmed by the amount of work that is expected of me.
8) I am hardly ever satisfied with my achievements.

Table 1. Selected Demographic Characteristics of Study Participants.

Characteristic	Frequency	Percent
Gender		
Male	157	50.0
Female	157	50.0
	314	100.0
Martial Status		
Married	246	78.4
Separated/Divorced/Widowed	29	9.1
Single	39	12.5
	314	100.0
If married, does your spouse/partner work?		
Yes	257	82.0
No	57	18.0
	314	100.0
Level of Household Income		
Less than $30,000	20	6.3
$30,000 to $44,999	55	17.4
$45,000 to $59,999	49	15.7
$60,000 to $74,999	71	22.6
Over $75,000	119	38.0
	314	100.0
Area of Appointment		
State	225	24.8
County	78	71.8
Other	11	3.4
	314	100.0
Satisfaction with amount of housework done at home		
Very satisfied	39	12.3
Satisfied	109	34.6
Dissatisfied	120	38.4
Very dissatisfied	46	14.7
	314	100.0
Number of Children under 18 years of age		
Mean = 2.13 SD = 0.9		
Average time (hours) spent with family per week		
Mean = 30.8 SD = 19.9		
Age of Respondents		
Mean = 46 SD = 10		

Factor analysis of the dependent variable produced a single overall stress factor with an Eigenvalue of 3.58, which explained 47 percent of the variation within the model. Alpha reliability for this index was .83. Each respondent's individual perceived stress index score was figured as the mean of the responses to the eight questions. Subsequently, the mean of all the respondents' perceived stress index scores was taken. The mean of all the respondents' scores for the dependent variable was 3.02 with a standard deviation of .70.

Based upon this mean score, it was determined that faculty on average were neutral in regards to their overall levels of stress. Mean variation documents that some faculty have stress under control while others are under high levels of stress. Mean differences denoted that county faculty perceived slightly higher stress than state faculty, but this was not statistically significant.

A number of independent variables were analyzed in this study, and these are noted in Table Two along with the factor analysis results. These variables were blocked into two logical categories to help explain probable causes of stress. The table denotes each of the blocks utilized in the factor analysis including the individual measurement items.

Table Three denotes the results of the multivariate analysis for this study, and the full model is presented with all variables placed in the model[1]. The first variable, workday planning, was statistically significant. As respondents reported greater use of things like "to do" lists, formal planning, and planning for meetings, stress scores tended to be less. A similar pattern was observed for the variable managing others, but this relationship was not statistically significant. Time pressure was the most important variable in the model. This indicated that if respondents agreed more with the variables of being over-committed, continuous multi-tasking, working late, and feeling like they were always racing against the clock; their stress scores tended to be much higher.

Seven items related to household and individual demographics were asked. One demographic item was statistically significant, time spent with family. Faculty who spent more time with their family tended to report less stress. The explained variation in this model was 40 percent.

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[1] Multiple correlation linear regression with a small sample size can present severe multicolinearity problems. Careful use of informal diagnostics such as the zero-order correlations and scatter plots of the standardized residuals revealed little impact of the effects of multicolinearity. Further, a formal diagnostic statistic, the variance inflation factor (VIF), was utilized. This statistic indicates how the inclusion of a dependent variable in the model inflates the standard error of the other independent variables. VIFs greater than 10 are generally thought to have undue influence in the Ordinary Least Squares estimation (Lunneborg, 1994). In no case were the VIFs in the following analyses equal to 10 or greater.

Table 2. Blocks of independent variables utilized in the factor analysis.

Blocks, items measured and results of Factor Analysis by block.

Work Place Skills

A. Work Day Planning / Preparation

1) I do formal planning for complex tasks.
2) I prepare to get the most out of meetings.
3) I work effectively while traveling.
4) I procrastinate.
5) I have a prioritized to-do list.
6) I schedule important work for the time of day when I am most effective.
7) I plan my work, and work my plan.

* Factor analysis yielded an Eigenvalue of 3.54, which explained 47 percent of the model variation. Alpha index reliability = 0.77. Mean Work Day Planning score = 3.52, SD = 0.58 of 5-point Likert-type scale: 1) Never, 2) Seldom, 3) Half of the time, 4) Often, 5) Always.

B. Time Pressure

1) I seem to be in a hurry and racing against the clock.
2) I find myself doing two or three things at one time, such as eating lunch and writing a memo, while talking on the phone.
3) I over-commit myself by biting off more than I can chew.
4) I find myself continuing to work after my coworkers have called it quits.

* Factor analysis yielded an Eigenvalue of 3.27, which explained 43 percent of the model variation. Alpha index reliability = 0.65. Mean Time Management score = 3.73, SD = 0.75 of 5-point Likert-type scale: 1) Strongly Disagree, 2) Disagree, 3) Neutral, 4) Agree, 5) Strongly Agree.

C. Managing Others

1) I handle casual visitors effectively.
2) I control distractions.
3) I delegate effectively.

* Factor analysis yielded an Eigenvalue of 3.31, which explained 57 percent of the model variation. Alpha index reliability = 0.57. Mean Managing Others score = 3.31, SD = 0.59 of 5-point Likert-type scale: 1) Never, 2) Seldom, 3) Half of the time, 4) Often, 5) Always.

Table 2. (continued).

Perspectives on Work

A. Work Addiction

1) I prefer to do most things myself rather than ask for help.
2) I feel guilty when I am not working on something.
3) It is hard for me to relax when I'm not working.

* Factor analysis yielded an Eigenvalue of 3.04, which explained 40 percent of the model variation. Alpha index reliability = 0.58. Mean Work Addition score = 3.04, SD = 0.84 of 5-point Likert-type cale: 1) Strongly Disagree, 2) Disagree, 3) Neutral, 4) Agree, 5) Strongly Agree.

B. Job Satisfaction

1) I feel that my working conditions are good.
2) Considering my job responsibilities there is no way I could do my job properly.
3) My work brings me satisfaction.

* Factor analysis yielded an Eigenvalue of 2.93, which explained 39 percent of the model variation. Alpha index reliability = 0.55. Mean Work Addition score = 3.53, SD = 0.49 of 5-point Likert-type scale: 1) Strongly Disagree, 2) Disagree, 3) Neutral, 4) Agree, 5) Strongly Agree.

Table Three. Results of Multivariate analysis categorized by block.

	Full Model			Reduced Model		
	b	B	SE*b*	*b*	B	SE*b*
Work Place Skills						
Work day planning	-.249*	-.201	.077	-.293*	-.241	.061
Time Pressure	.481*	.508	.055	.483*	.515	.047
Managing Others	-.009	-.079	.082			
Demographics						
Age	.001	.090	.005			
Income	.003	.050	.045			
Gender	-.008	-.057	.09			
House work	-.004	-.061	.048			
Time spent w/family	-.005*	-.133	.002	-.005*	-.144	.002
Partner works	.003	.018	.109			
State or County appointment	-.163	-.102	.100			
Constant	2.351*					2.375*
Adj. R^2	.40					.37

*$p<.05$

The reduced model contains only those variables that were statistically significant in the full model. Only three variables in this model explain 37 percent of the variation. The items related to workday planning and time pressure remain statistically significant and relatively important in the model (as observed in the standardized Betas). Time pressure is by far the strongest explanatory variable in the model, followed by workday planning, and time spent with family.

Conclusions/Recommendations

The results of this study document that stress exists among Extension faculty, and this substantiates the findings of other authors who have wrote about stress and balancing work and family for Extension professionals (Fetsch and Pergola, 1991; Riggs and Beus, 1993; Fetsch and Kennington, 1997). Because of the nature of Extension, there is always going to be a certain level of stress from dealing with wide varieties of constituencies and program requirements. This study has served to delineate a number of factors that are directly correlated to stress for Extension faculty and staff.

Workday planning is of great significance, and this was found to be an important item in regards to overall stress for Extension educators. The results showed that the factors related to time pressure were the strongest. The more one was over-committed, worked late, constantly multi-tasked, and felt like they were always racing, the greater their stress scores. On the other hand, those faculty who were able to manage their day and minimize time pressure experienced lower stress. Similar direct correlations were noted with managing others, scheduling and planning. Those who had not mastered planning, scheduling (to-do lists), delegating, and controlling distractions had significantly higher stress scores versus those who were adept with these traits and skills.

In one respect, these results are actually very encouraging in that most of these skills can be improved upon through professional development. Training programs and inservices focusing on workday planning can be implemented, which are frequently effective in regards to changing knowledge and behaviors (Abernathy, 1999; Douglas and Douglass, 1980; Mackenzie,1972). Improvement in the areas of workday planning by Extension professionals would constitute a tripartite benefit.

The Extension organization would realize a significant benefit from improved employee productivity and efficiency in addition to improved morale leading to greater work satisfaction and less employee attrition. Secondly, Extension professionals would have a direct benefit from feeling less stress and pressure to bring about greater personal satisfaction and less burdensome attitudes (Kirkpatrick et al., 1996). They would feel much better about themselves and their career. Lastly, Extension professionals would experience an indirect benefit of more personal time. This time could be invested for developing and nurturing family relationships and personal interests, bringing about greater individual and family appreciation and gratification.

The block of household and individual variables provides some very interesting insight into how Extension faculty cope with stress. Faculty who reported more time with family exhibited less stress as compared to cohorts. It was theorized that faculty who spent time with their family tended to emphasize the importance of time with their family. Time spent with family served as a coping mechanism for minimizing stress for these Extension faculty (Pearlin, 1989).

Educational Implications

Stress, time management, and balancing work and family continue to be issues for Extension and its people. The demands are great for Extension professionals to meet clientele needs and document widespread impact and change. Extension as an organization must address these issues for the long-term best interest of the organization. Greater organizational effectiveness can be achieved through employees who are able to manage stress and work pressure via positive workplace skills. Proactive professional development in these areas would be very beneficial, and as such, is highly recommended.

This study has clearly documented the significance of time and work management on workplace stress. Proactive workday planning, scheduling and management were highly correlated with less individual stress. Through professional development efforts, positive changes are possible for individuals among these competencies. The ascribed need for training on these topics among Extension professionals is critical.

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Balancing Work and Family: Professional Development Needs of Extension Faculty

A Critique

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Job stress has long been an issue of concern among professionals. Extension professionals are not immune from the pressures of stress. The authors focus on Extension professionals in Florida, although, based on the previous papers on Extension issues, we don't know if their concerns apply elsewhere. However, over the years, there have been a large number of studies on stress. Apparently the authors thought another study was needed. While the paper puts emphasis on stress factors, the title seems to imply a research emphasis or focus on balancing work and family. Most papers take their titles from the purpose and objectives.

The authors present a thorough literature review and establish the fact that stress is a critical area needing attention in professional development. Given this thorough review of the literature, the authors do not provide a clear rationale for this particular study at this particular time.

Additionally, the methods and procedures for this study appear to be explained very briefly. It would have been helpful to have a fuller explanation of the procedures used and a more complete description and justification for the analysis used in the study. The large footnote used for the explanation of multiple correlation linear regression should have been a part of the explanation of the procedures in the study. Information like this properly placed in the paper enhances organization and presentation of the major items needed for clarity of content and contribute to the rationale for using these procedures.

While the study was interesting and results revealing, there are a number of questions that require attention:

1. Could the data have been presented in a clearer and more understandable format? Some tables used a number (1 & 2) in the label and some used the word (three). Traditionally, tables should be able to stand alone. Could the labels be more descriptive?
2. The conclusions basically restate the findings. What major conclusions, given the findings, can we draw from the study?
3. There appears to be one recommendation and it doesn't appear to be very strong nor is it based on the findings of the study. It is based on various authors views located in textbooks. What recommendations come from the data in this particular study?
4. The meaning of paragraph 4 under the conclusions/recommendations is not clear. Are these statements justification for inservice education?

The last paragraph of the paper boldly declares that the study "clearly documented significance" of various stress factors. This statement is clearly debatable.

There are concerns about this study but the authors are encouraged to continue their investigations regarding professional development issues.

The Impact of Overseas Assignments on Individual, Organizational and Community Attitudes, Behaviors and Support for International Extension Involvement

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Abstract

This study was conducted to determine the domestic implications of the Polish-American Extension Project (PAEP). Such assessments were personal and professional impacts of the overseas experience on participants, the impact of the experience on colleagues and near-associates, as well as an estimation of the depth of awareness, support, and involvement with the overseas assignment within the home institution/organization and communities of participants. The population for the study was 70 Extension professionals from 26 states who served one or more six-month assignments. A mixed-method design was utilized with quantitative (mail survey of participants and telephone survey of secondary contacts) and qualitative methodologies (semi-structured on-site interviews) used in conjunction.

There were unanimous feelings and extremely high ratings for the impact of the experience on participants, personally and professionally. Participants and spouses noted the impact of the experience as being stressful but very positive for their families. The PAEP participants were highly motivated and interested in international activities, but had little previous international experience. The Extension roles assigned in Poland were similar to their roles in the United States. Participants felt both positive and negative pressures within their Extension organizations and high degrees of ambivalence. The Polish-American Extension Project can be considered a success in both building a client-driven, market-oriented Agricultural Advisory Service in Poland and in strengthening the international interests and competencies of personnel and clientele of the U.S. Extension system.

Some elements of the PAEP project that could have been improved to support and facilitate family involvement include assistance in locating housing, schooling, and other services; access to translators for family business needs; inclusion of family members during in-country staff meeting and activities; financial support for transportation and living expenses of family members; and access to language instruction and greater information on Polish culture, customs, and daily living conditions. International Extension programs need to encourage communication and interaction as well as facilitate the involvement of families to strengthen and extend educational possibilities. In the future, more effort needs to be placed on the establishment of mutually beneficial collaborative global partnerships. Cooperative international efforts will help foster better awareness, understanding, new information, and linkages between the United States and other countries through a spirit of camaraderie and partnership.

Introduction/Theoretical Framework

The *Polish-American Extension Project (PAEP)* began in 1989 and ended in 1995 with a primary objective of improving the structure of Polish agriculture with the goal of increasing agricultural production efficiency and improving rural quality of life (Yeutter in Bahn, 1997). The project was established as a joint educational project of the United States Department of Agriculture's Extension Service (USDA-ES) and the Polish Ministry of Agriculture and Food Economy's (MAFE) Agricultural Advisory Service. Between 1990 and 1995, more than 100 American Extension professionals representing 31 land grant universities traveled to Poland to work in this project. Over the period of the project, 70 Extension professionals representing 26 states served one or more six-month assignments as advisors. This group and their states and communities were the population for this study.

The Polish-American Extension Project was selected as the study focus for several reasons. The project itself was successful and serves as an exemplary overseas cooperative assistance program. Bahn (1997) found overwhelming success of this project in meeting its objectives in Poland in his follow-up evaluative study of program impact. The provincial-level project created a foundation for a progressive Extension system in Poland by changing the mentality of Extension workers and clientele. The project stressed agricultural economic, market and Extension education that led to positive growth in clientele through changes generated within the Polish Extension system.

Purpose of the PAEP Project

The primary objective of the Polish-American Extension Project (PAEP) was to improve the structure of Polish agriculture with a goal of increasing agricultural production efficiency and improving rural quality of life (Yeutter in Bahn, 1997). There were three focusing factors of this international assistance effort for the Polish Extension System:

- Development of Extension organizational and methodological skills to plan and implement educational programs that were client derived.
- Building understanding of economic principles and development of skills necessary for management, marketing and agribusiness development.
- Targeting of assistance to the local provincial level rather than the ministerial or national level to assure local emphasis and applicability (Bahn, 1997).

Participants of the five-year Polish-American Extension Project consisted of Extension agents and specialists from the United States who were placed in provincial-level agricultural Extension offices (ODRs) for assignments lasting six months. Although assignments were originally designated as six-month assignments, fifteen participants chose to stay on for successive six-month terms for a total duration of one year, and two participants stayed for 18 months. Team members worked collaboratively with Polish Extension counterparts in one of Poland's 49 provincial ODR offices to plan, design, develop, implement and evaluate Extension programming. A personal hands-on approach was emphasized for attaining the educational objectives of the project (Bahn, 1997; Ragland, 1995).

Public perceptions of foreign assistance

Numerous studies and surveys have been conducted in the United States to learn more about public attitudes and sentiment regarding international assistance. A number of U.S. citizens are reported to question involvement with foreign nations and people. Such an isolationist view of the world is reflected in feelings that the U.S. has enough domestic problems and situations that should be addressed, and not enough time or resources are devoted to these causes. Many contend that the resources, time and effort spent globally could be better spent at home. In actuality, the United States spends the least percent of gross national product of all highly developed countries for international development projects (Holsti, 1996).

United States farmers, like other citizens, question what they gain from international development efforts and assistance. There are many agricultural producers who feel that these efforts simply add competitive supply to the worldwide market causing further deterioration of commodity prices. Farmers also have a need to understand the ramifications of cooperative international development assistance.

Paarlberg (1991) has written about the positive effects of development for increased world trade and enhanced U.S. exports. He notes that hunger does not build commercial markets; neither does population growth by itself. It takes purchasing power to build effective markets. When poor people obtain greater income, the first thing they do is spend it to upgrade their diets. "Large numbers of hungry people without purchasing power aren't a commercial market; they're just large numbers of hungry people. The key to rapid broad-based income growth in most poor countries is success in agriculture fostered by agricultural development assistance." (Paarlberg, 1991, p. 10)

Exports generate over half of the gross national product for United States agriculture. Developing countries account for about half of all of United States agricultural exports, and this is progressing the quickest in the developing countries with the most rapid growth in per capita income (Bissell, 1991). Although most of these countries are expanding their agricultural output at a rapid rate, the demand for more and better food is outstripping their production capacity. These countries are becoming middle-class countries that can afford the luxury of being cash export markets with the United States and other developed countries. Eastern Europe and many former Soviet states are another potential market for U.S. exports.

As noted by Schumacher (1998), another advantage of cooperative development programs is the tremendous advantage it provides for agricultural research. The United States has been able to hold down agricultural production costs through research and improved technologies such as better varieties of crops. Cooperative arrangements are necessary to keep these doors open for research and development. Many crops grown in the United States, such as corn, wheat, soybeans, and others depend on foreign sources of germplasm; "germplasm from which to select desirable characteristics such as dwarf stature, resistance to insect pests and diseases, day-length insensitivity and high yield potential" (Bissell, 1991, p. 3). These germplasm resources are only available through international cooperative efforts.

Purposes/Objectives

The purpose of this evaluative study was to document the impact of overseas technical assignments on the individuals involved, and on the organizations and communities from which they were based. The population involved in this investigation were the group of seventy extension professionals who participated in the *Polish-American Extension Project,* and their near-associates. Near-associates were defined as those who had close contact with a PAEP participant, which included county and state extension units, families, and representatives of communities/clientele.

This study was conducted to determine the domestic implications of the Polish-American Extension Project (PAEP). Specific objectives included:

- Assessment of personal, family, and professional impacts of the overseas experience on participants.
- Assessments of the impact of the experience on colleagues and near-associates as to their support for technical cooperation and, in general, U.S. foreign assistance.
- Estimation of the depth of awareness, support and involvement with the overseas assignment within the home institution/organization and communities of participants.
- Documentation of the extended involvement of participants, colleagues, community members/groups, and constituents in continuing interactions with Poland, including any social, cultural or economic endeavors that have benefited Polish colleagues or a larger cross-section of Americans.

Methods/Procedures

The population for this study was the 70 individual Extension professionals from 26 states who served one or more six-month assignments. Three different data collection procedures were used to gather details leading to a better understanding of the domestic effects of an international cooperative assistance project. These included a census-type mail survey, a set of random personal site visits and telephone interviews.

The overall design was a descriptive case study to systematically describe the domestic implications of the Polish-American Extension Project on participants, near-associates, the extension organization and local communities. A mixed-method design was utilized in which quantitative methodologies (a mail survey of participants and a telephone survey of secondary contacts) was used in conjunction with qualitative methodologies (semi-structured on-site interviews). Data analysis proceeded sequentially: the preliminary analysis of the survey data provided a foundational basis for the subsequent development of interview questions and analysis of the resulting qualitative data. The survey also provided names of secondary contacts, individuals or organizations that were linked with Polish interests during or after the PAEP assignment, who became the sample for the telephone interviews.

Survey data collection and analysis

Introductory letters were sent from the Program Specialist of USDA's Office of International Extension Programs to state level Extension administrators for the 26 states that had participants in the PAEP program. This letter served as a means of informing and gaining support for the PAEP follow-up study at a state administrative level. The actual questionnaire was sent to the 70 PAEP participants with an informing and encouraging cover letter. The 19-page questionnaire consisted of the following major sections: work and living environment; perceptions about the international experience; respondent and home Extension unit characteristics while in Poland; characteristics of the U.S. Extension unit and community while in Poland; nature of the assignment in Poland; the U.S. international Extension climate; reentry and adjustment; output and visibility; and key linkages. The results from this questionnaire have been previously reported (Place and Evans, 1999).

On-site visits

A selection of on-site interviews was planned as a means of complimenting the survey data. The on-site visits also provided access to family members and near-associates who could broaden and supplement the perceptions of participants for a more accurate assessment of impacts. Eight states (33%) were selected at random from a list of participating states, stratified by region. Thus two states per region were selected. Within the selected states a purposeful sample of participants were targeted to represent a diverse sample across states. The sampling frame (Denzin & Lincoln, 1994) was established around the factors of male/female, single/multi-term assignment, program focus, and county/state staff. Geographical dispersion was also taken into account when there were opportunities to conduct on-site visits for more than one PAEP participant. Qualitative data derived from a validated structured interview guide were entered into a Microsoft WordÓ document and categorized for subsequent content and critical incident analysis (Denzin and Lincoln, 1994). The research team reviewed data an additional time for completeness and accuracy.

Telephone interviews with secondary contacts

To learn more about local linkages and impact, a thorough description was utilized. In both the mailed survey questionnaire and during the on-site interviews, participants in the PAEP were asked to identify persons or organizations in the U.S. with whom they referred or connected to Polish people or organizations. It was the desire of the evaluation team to contact a sampling of these individuals to further describe the type of linkage and its value to the participants. Few actual linkages were identified, perhaps because of the length of the questionnaire or the nature of the request demanding information not readily available. This was a disappointment to the evaluation team as they themselves were aware of linkages that were not identified. During the site visits, those participants involved were queried about linkages and often very rich, descriptive information was conveyed.

The actual list of contacts for information about linkages included only 50 names. Of these 50 referrals, 28 were available to be interviewed by phone and asked to comment on their experiences. As with the on-site interviews, a structured interview guide was used for these telephone interviews. The data were analyzed via a Microsoft WordÓ document for subsequent content and critical incident analysis (Denzin and Lincoln, 1994).

This paper focuses on the wealth of data and information derived from the qualitative research.

Limitations of the study

As with all research relying on self-reported data, this study has its limitations. The investigators utilized steps identified by Patton (1990) and Lincoln and Guba (1985) to overcome potential sources of bias resulting from qualitative research.

1. Subjective or sampling bias of the reported findings may effect the generalizability of the research. There is a potential for "halo effect" data from near-associates who desire to provide "good" data. There may also be subjective bias on behalf of the researcher as to how the data were interpreted which may influence the findings. The team established joint awareness and sensitivity to this issue to help minimize its impact.
2. An audit trail was utilized to record every step of the research process for documentation and to enable replication of the research.
3. Triangulation was utilized between participant questionnaire findings and within states among interviewees to substantiate findings and conclusions.
4. The investigators relied on the regular help and advice of others throughout the process to validate and verify steps taken and conclusions drawn. Others included the research team, University faculty, and staff from the USDA-CSREES International Office.

Results/Findings

The following synopsis provides a summary of the findings from this evaluation study. The items noted are those that surfaced as either positive or negative aspects of the Polish-American Extension Project.

1. The technical cooperation model of development assistance operationalized in the Polish-American Extension Project (PAEP) can be considered an appropriate and dynamic model that indeed produced benefits for both Poland and the U.S.
2. The Polish-American Extension Project was successful in having strong and positive impacts on U.S. participants, families, near-associates, their Extension organizations, and their communities.
3. The 70 participants in the PAEP were mature and experienced Extension professionals from both county and campus based locations.
4. The PAEP participants were highly motivated and interested in international activities, but had little international experience.
5. The Extension county units of the PAEP participants had limited prior international exposure.
6. The Extension roles assigned in Poland were similar to their roles in the U.S
7. Participants found it relatively easy, although challenging, to work in Poland.
8. Participants were extremely satisfied with their work in Poland.
9. Participants felt that they were successful in their work in Poland.

10. Participants were generally satisfied with the level of support received for taking the international assignment; however, they felt that their families, friends and clientele were more supportive than their Extension colleagues and the Extension organization.

11. Participants felt both positive and negative pressures within their Extension organizations and high degrees of ambivalence.

12. Participants were highly supportive of the international dimension in Extension; more highly supportive than a comparison group of county agents surveyed in 1986 (Andrews and Lambur, 1986).

13. Awareness and visibility for the international assignment was variable, more likely limited to near-associates, and dependent on self-initiation.

14. Participants and organizational colleagues were satisfied with the moderate level of interaction and communication while on assignment, but reported that communications could have been improved.

15. Although county offices accommodated very well in managing during the absence of the participant, issues of coverage or program backfill were of concern to everyone.

16. There were unanimous feelings and extremely high ratings for the impact of the experience on participants, personally and professionally. These impacts included changes in knowledge, attitudes, perspectives, and behaviors. They and their colleagues recognized significant changes in their demeanor and performance. The experience was viewed as an important time of reflection and perspective taking.

17. Participants perceived that the international experience created positive influences on their stature in the organization and community.

18. Participants were slightly disappointed in the reactions of peers and coworkers, labeling them as being indifferent.

19. Participants were disappointed in that it was not readily apparent that their experiences in Poland were taken into account in performance appraisal.

20. Participants and spouses noted the impact of the experience as being stressful but very positive for their families.

21. Participants indicated that they would consider another international assignment and would clearly want to involve their families in a future assignment.

22. Participants took extensive steps to integrate the experience into subsequent Extension programming through presentations, the sharing and development of materials, individual counseling, and creating linkages between the U.S. and Poland.

23. An amazing high level of interaction with Polish people and organizations occurred, and it continues today.

24. Over 15,000 citizens in communities throughout the U.S. benefited from increased awareness and knowledge of Poland and conditions of life and agriculture in Poland as a result of post-participation presentations.

25. Citizens and community leaders were extremely supportive of the international project and of Extension's role in it.

26. Participants established over 500 linkages between U.S. and Polish interests. These linkages were important personal experiences whereby citizens gained knowledge and appreciation for international involvements.

27. Participants in linkages reported very positive views about their interactions and about the learning value of their experiences.

28. Based on three rating scales, citizens and professionals in Extension are extremely supportive of international involvements for USDA, universities, and citizens. Only coworkers differed in having slightly lower ratings for the importance of international cooperative assistance involvements for USDA and universities.

Conclusions/Recommendations

It has been acknowledged that the PAEP has had tremendous impact upon the U.S. Extension system and the local communities from which participants were based. The following recommendations attempt to highlight the strengths and weaknesses of the project and the systems involved so as to improve future projects of this nature and to strengthen the international dimension within Extension. The participants and interviewees contacted expressed these recommendations in various ways.

Structure of international technical assistance programs

The technical cooperation model, having expectations and strategies to ensure mutual benefits, is appropriate in the Extension setting and should be applied in future international projects. In fact, this model is a natural fit for Extension as the embeddedness of Extension personnel in their communities creates access for widespread educational and economic benefits.

The experience from the PAEP suggests the following strengths:

1. That the six-month assignment (with opportunities for extension) is an appropriate period of time.
2. Both participants and hosts value national recruitment within the Land Grant System that brings professionals together from diverse locations and backgrounds.
3. Orientation for both participants and family members is necessary and useful, such as was provided in Washington, DC and Warsaw, Poland.
4. The management style employed in the PAEP that encouraged autonomy and flexibility was appreciated.
5. The project benefited from strong linkages and access to the U.S. Embassy in Poland, other U.S. agencies and public and private organizations. These relationships removed barriers and mobilized resources in support of the project.
6. The continuation of positions and benefits within Extension during the assignment was essential to accessing participation.
7. The potential for this international Extension model to have a positive impact beyond the immediate participants, to U.S. coworkers and audiences is extensive.

The following could have strengthened the project and model:

1. The impact of the model in the U.S. could have been strengthened with clear expectations and guidance for communications and interactions with local communities during the assignment. Local offices could benefit from briefings or orientation about their role in supporting interactions and visibility in the community.
2. Preparations for reentry could be strengthened. Newly acquired knowledge and experiences need to be recognized and integrated into ongoing roles. Plans for sharing and dissemination should be developed with broad input from local interests.
3. Communications and logistics from USDA could be improved. The partnership

between USDA and the Land Grant System needs to be strengthened to insure adequate support for the recruitment, transition, and follow-up activities that facilitate benefits to local communities.

4. More open system-wide announcements of opportunities, greater lead time for personal and professional preparation, including the identification of backfill arrangements, more timely acknowledgment of assignments and access to travel documents and clearer understandings of shared responsibilities all could improve the transitions and ultimately the working relationships that influence a strong supportive climate for international programming.

5. Financial support that is actually available for state and local program support is critical for sustaining enthusiasm and participation.

State Extension organizations: structures and practices to support internationalization

The Land Grant System is a unique and valuable resource for International cooperation efforts and for bringing international knowledge and information back to communities in the U.S.

1. Extension personnel are embedded in communities across the landscape and thus can readily involve the public in international educational activities.

2. The PAEP experience showed that even Extension professionals with limited international experience could be successful in accomplishing project objectives in Poland and in impacting positively on their state and local organizations and publics.

3. Participants themselves gained valuable experiences that changed knowledge, attitudes, skills and perspectives, deepened appreciation for the basic values and principles of Extension work and helped individuals recognize the uniqueness of the U.S. Extension model.

4. The participation of county staff in an international project generated interest, acceptance, and enthusiasm within the Extension organization for further professional involvement in international activities. Participation in the PAEP often stimulated interest in international programs among volunteers and community members as well.

5. Participants gained increased credibility and esteem in the eyes of clientele. They became role models and resources for local communities who used their expertise and experiences to expand international awareness, appreciation, and linkages.

The experience of the PAEP project also suggests that the state and county Extension organizations were not as prepared as would be desired in supporting the smooth and effective mobilization of international assignments.

1. Greater clarity of expectations and roles was needed between USDA and State Extension organizations.

2. Institutional and organizational development for the international dimension in Extension is needed.

3. International assignments for Extension county and campus staff should be continued and increased.

4. A broad range of expertise in available in Extension that is not always used in the international arena. Opportunities should be created for professionals with expertise in family and consumer sciences, 4-H and youth work, community development, tourism, small and home based business development, and others.

5. Opportunities for in-service and professional development in the areas of international trade and development would be useful in developing the international competencies of Extension staff.

6. Clarity of mission, structure and operational procedures within Extension for international programming would improve morale and enlarge participation.

7. Factors should be built-in for performance and professional growth from international assignments.

Family involvement and support

The PAEP project made provisions so that family members could accompany participants during the assignments. The value of their participation in the PAEP project may have been underestimated or overlooked. Families served important support functions in Poland and were primary contacts to extend information and linkages to local communities.

1. Family members contributed directly to the success of the PAEP project by serving as volunteer teachers, community spokespersons, and support systems for PAEP participants.

2. Family members, because of their ties to local schools, churches, and other community organizations, served as primary conduits for the sharing of information about life in Poland and in creating linkages between Polish and U.S. interests.

Some elements of the PAEP project that could have been improved to support and facilitate family involvement include:

1. Access to language instruction and greater information on Polish culture, customs and daily living conditions.
2. Assistance in locating housing, schooling and other services.
3. Access to translators for family business needs.
4. Inclusion of family members during in-country staff meetings and activities.
5. Financial support for transportation and living expenses of family members.

Summary of Findings

The Polish-American Extension Project can be considered a success in both building a client-driven, market-oriented Agricultural Advisory Service in Poland and in strengthening the international interests and competencies of personnel and clientele of the U.S. Extension system. In an era of technical cooperation, all parties involved in technical assistance should reap benefits. For the U.S., those benefits of the PAEP included:

1. Extension staff from 26 states with new knowledge, attitudes, and perspectives that raised their status and functioning within Extension and within their communities.
2. Family members with new skills and commitments to international involvement.
3. Extension organizations with greater experience in interacting with international colleagues and in recognizing the importance of an international dimension for Extension.
4. Community members with increased enthusiasm for international interaction and increased awareness and support for an international dimension within Extension and among citizens and government agencies, in general.

The model of sending subject matter specialists and county Extension agents on international assignments that closely parallel their roles in the U.S. proved very effective. U.S.

personnel felt comfortable with their assignments and perceived that they were able to contribute to the goals of the project in Poland. They also recognized benefits to themselves, their family members and their colleagues. Participants actively integrated their Polish experiences into their work with communities and clientele upon their return. Numerous presentations, linkages, and educational communications were developed to extend the experience to the U.S. A high level of interaction with Poland has continued and at least 15,000 citizens in communities throughout the U.S. have increased their knowledge of Poland as a result. Citizens and community leaders were found to be extremely supportive of an international dimension for Extension and welcomed interactions with Polish guests and connections. Over 500 linkages between U.S. and Polish interests emerged; many with lasting impacts on those involved. Both citizens and professionals in the Extension organization reported high levels of support for international involvements for agencies such as the USDA, for universities, and for citizens.

Educational Implications

The Polish-American Extension Project provided numerous opportunities for involvement outside the actual international project. Because of the resultant extended involvement and domestic benefit, many more people were able to gain international awareness, knowledge, and understanding through this global Extension project. As a result, people obtained an international experience who may not have otherwise.

International Extension programs need to encourage communication and interaction as well as facilitate the involvement of families to strengthen and extend educational possibilities. Families served in a strong supportive way during the PAEP international assignment for participating faculty and staff. Moreover, family members returned to the U.S. with greatly increased knowledge and understanding that was extended to others. This augmented and strengthened the domestic level of awareness and understanding that was actually attained.

In the future, more effort needs to be placed on the establishment of mutually beneficial collaborative global partnerships. This occurred to some extent with the PAEP, but could have been intensified. The results of this study also found that there is support among the general public to endorse programs that are mutually beneficial.

There are numerous contextual benefits that can be derived through cooperation and collaboration among international educational providers, businesses and individuals. Cooperative international efforts will help foster better awareness, understanding, new information, and linkages between the U.S. and other countries through a spirit of camaraderie and partnership.

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The Impact of Overseas Assignments on Individual, Organizational and Community Attitudes, Behaviors and Support for International Extension Involvement

A Critique

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The focus of this study was the Polish-American Extension Project (PAEP). The authors are to be commended for their work in the area of international agriculture and the role of Extension in developing international agriculture programs. Additionally, the authors are to be commended for identifying the weaknesses and limitations of conducting studies focused on self-reported data gathering processes. The problems the authors identified all apply to this study.

There are a number of concerns regarding this paper. Many of these concerns can be addressed by answering the following questions:

1. What is the theory base for the study? What is the rationale for the study? There seemed to be a limited research basis for the study.
2. What were the specific objectives for the study? The statements provided in the purpose and objectives section appeared to be more like goals than specific objectives. It was difficult to analyze the results without specific objectives.
3. What was the purpose of explaining the written survey data collection process? Was this description really necessary?
4. How many people were involved in the on-site visits? This number was never presented. Telephone interviews numbered 28 but it was never clear the total number contacted in both situations. Did you contact both groups?
5. Could there have been more explanation of the procedures? This explanation could help interpret the data with more confidence.
6. Could the findings be presented more concisely? Why not categorize the findings by major themes?
7. What is the connection between the strengths and weaknesses of the project and the conclusions and recommendations? It is difficult to determine what this section of the paper means. What can we conclude from the study?
8. Much of the paper deals with self-praise for this project. What specific indicators, beyond general observations and statements, warrant this positive summary?

While the paper was interesting to read and the PAEP program appears to have been successful, the report about the project seems more like a general program review than a scientific investigation into the effectiveness and impact of the program. A more tightly focused study might generate data that could be used as evidence of impact. Nevertheless, the authors should continue their efforts to study international agriculture programs and projects of this nature.

Relationships of Elementary Teachers' Perceptions and Activities Conducted Regarding the Integration of Agricultural Awareness Activities into the Curriculum

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Abstract

The purpose of this descriptive correlational study was to describe the relationships of selected demographic variables, activities conducted, and perceptions held by elementary teachers (K through 6) in a selected seven county area in east central Iowa. The three objectives of this study were: (1) To identify relationships among selected demographic variables of elementary school teachers' perceptions related to the integration of agriculture in elementary curricula, agricultural awareness, and the agricultural industry; (2) to identify relationships among selected variables as to the extent of agricultural awareness activities were conducted by elementary teachers; and, (3) to identify relationship among the perceptions domains and the agricultural awareness activities conducted (behavior) domain.

This study was conducted using a mailed questionnaire that measured teachers' perceptions. Agriculturally related activities were identified to indicate the extent to which these activities were conducted in elementary classrooms. Demographic information was also collected. Post hoc reliability alphas were 0.88 for the items related to Integration of Agriculture, 0.86 for the items related to Agricultural Literacy and Awareness, and 0.85 for the items related to the Agricultural Industry. The usable response rate of the sample was 41 percent (281 out of 689). Elementary teachers had positive perceptions regarding integrating agriculture into the elementary curriculum, the need for agricultural awareness in their education, and the need for the agricultural industry. Two hundred twenty-eight teachers (81%) indicated that they had conducted agricultural activities in their instruction at least once during the school year.

For the correlations, nine demographic variables were selected for the study: (1) gender; (2) degree of education; (3) grade levels taught; (4) years of teaching experience; (5) agricultural classes, workshops, or in-service programs taken; (6) agricultural experience; (7) agriculture teacher in the school district; (8) type of community; and, (9) school district enrollment. The coefficients among the matrix of relationships ranged from being negligible (.006) to low (.211) for the nine demographic variables, the three perception domains, and the behavior domain. Therefore, it was concluded that demographic variables of elementary teachers do not matter related to their perceptions and behaviors of integrating agriculture in the curriculum. Moreover, the relationships of the 3 perception domains and the behavior domain ranged from low (.171) to moderate (.584). Elementary teachers with positive perceptions of integrating agriculture in their curriculum were more likely to conduct agricultural activities in their classroom. The results of this study supported Fishbein and Azjen's (1975) attitude theory that positive beliefs and attitudes lead to specific intentions and behaviors.

Introduction and Theoretical Framework

Agricultural educators have discussed the need for instruction about agriculture in elementary grades for many years (Fox, 1932; Herr, 1968; Keenan, 1970; Peterson & Bardson, 1973; Shepard, 1970; Shively, 1936; Snowden & Shoemake, 1973; Swan & Donaldson, 1970; Wolfson, 1970;). In 1988, the National Research Council recommended that "beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture" (p. 2). The National Research Council (1988, p. vi) defined agricultural literacy as "an understanding of basic concepts and knowledge spanning and uniting all of these subjects" that broadly encompass agriculture. Moreover, Frick, Kahler, and Miller (1991) defined agricultural literacy as "processing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52). Although agricultural literacy and agricultural awareness are closely related, the term agricultural awareness was used for this study and was conceptualized as "experiencing or exploring agriculture as it relates to the subject matter being studied or context of life being lived; the ability to identify the connections of agriculture to areas of study or life" (Knobloch, 1997, p. 12).

In reviewing the related literature, agricultural educators have found that teachers and students vary in their perceptions and knowledge of agriculture. Elementary teachers had little knowledge of agriculture (Terry, Herring, & Larke, 1992; Swan & Donaldson, 1970). Students lacked basic knowledge of agriculture according to Horn and Vining (1986, cited in Herren & Oakley, 1995). On the other hand, Humphrey, Stewart, and Linhardt (1994) found that preservice elementary teachers' knowledge of agriculture was high and their perceptions towards agriculture were generally positive. Moreover, Harris and Birkenholz (1996) concluded that secondary educator groups were knowledgeable of and had positive attitudes toward the industry of agriculture.

A teacher's background and experience plays a significant role in educating students about agriculture. Researchers have found that teachers with agricultural experience had more agricultural knowledge and more accurate perceptions of agriculture (Humphrey, Stewart, & Linhardt, 1994; Terry, Herring, & Larke, 1992). Further, preservice elementary teachers with agricultural experience have been found to be more confident in teaching agriculture (Humphrey, Stewart, & Lindhardt, 1994). Rudd and Hillison (1995) concluded that teachers' knowledge, attitude, and expectations of a new curriculum were positively correlated predictors of the amount of new curriculum taught.

Agricultural educators have advocated that agriculture should be integrated into elementary classes (Birkenholz, Frick, Gardner, & Machtmes, 1994; Leising & Zilbert, 1994; Terry, Herring, & Larke, 1992; Frick, Birkenholz, & Machtmes, 1995). Trexler and Suvedi (1998) found that elementary teachers in Michigan were sometimes comfortable using the problem solving method, connecting science teaching to community problems, and using agriculture as a context for science. Furthermore, elementary teachers moderately supported the concept that science can be taught through agricultural examples (Trexler & Suvedi, 1998). In addition, Balschweid, Thompson, and Cole (1998) found that K-12 teachers perceived their students most interested in animals, crops, and food processing. Elementary teachers in Texas taught agricultural knowledge and concepts approximately 8 hours a year (Terry, Herring, &

Larke, 1992).

Intervention programs with elementary teachers have shown positive results. Balschweid, Thompson, and Cole (1998) found that 90 percent of the elementary and secondary teachers who participated in an agricultural literacy in-service program integrated agriculture into at least one of their lessons. Trexler and Suvedi (1998) found that teacher perceptions of agriculture and confidence toward integrating agriculture into science improved after a curriculum intervention program on science and agriculture. Herren and Oakley (1995) concluded that elementary teachers taught how to integrate Agriculture in the Classroom resources, reported higher student achievement of agricultural concepts. In addition, the program has been effective for students in rural and urban settings (Herren & Oakley, 1995).

Mawby (1985) suggested "few issues are of greater importance to the world than adequate food supplies, proper food use, and knowledge about the components of the agricultural industry" (p. 7). Spokespersons outside of agricultural education have recommended that agricultural knowledge be taught in the elementary school grades (De Christopher, 1993; Lucht, 1993). The literature provides ample evidence that agricultural awareness is a worthy area of inquiry.

The philosophical base underpinning the need for agricultural awareness in elementary classrooms was based on Dewey's (1938) philosophy of education. Dewey stated that "anything which can be called a study, whether arithmetic, history, geography, or one of the natural sciences, must be derived from materials which at the outset fall within the scope of ordinary life experience" (p. 73). Further, Dewey expounded,

> It is a sound educational principle that students should be introduced to scientific subject matter and be initiated into its facts and laws through acquaintance with everyday social applications. Adherence to this method is not only the most direct avenue to understanding science itself as the pupils grow more mature it is also the surest road to the understanding of the economic and industrial problems in present society. For they are the products of a large extent to [sic] the application of science in production and distribution of commodities and services, while the latter processes are the most important factor in determining the present relations of human beings and social groups to one another (p. 80).

Therefore, integrating agricultural awareness activities into elementary education would provide learning opportunities based on experiences related to production and distribution of commodities and services—agriculture. Significantly, agriculture has employed more people than any other industry in the nation (American Farm Bureau Federation, 1998). Dewey (1938) expostulated that schools should teach students to learn knowledge and thinking skills by solving problems in real life experiences. Since agricultural education teaches students how to solve problems, the integration of agriculture in elementary education could be based upon sound pedagogical principles.

The role of the teacher has been shown to be very important for integrating agriculture in the elementary curriculum (Terry, Herring, & Larke, 1992). Therefore, if teachers are change agents for integrating agriculture into the elementary curriculum, then their perceptions about the integration of agriculture, need for agricultural awareness, and agricultural industry would affect the integration of agriculture into the elementary curriculum. This study was based on the premise that "values, attitudes, needs, and wishes, as well as impulses and motives, are projected upon objects and behaviors outside of the individual" (Kerlinger, 1973, p. 514). Therefore, people perceive the world through their own set of values, beliefs, attitudes, and intentions. Although some researchers (Humphrey, Stewart, & Lindhardt, 1994; Terry, Herring, & Larke, 1992) studied pre-service and in-service elementary teachers' knowledge and perceptions of agriculture, the agricultural education profession has not sufficiently addressed the perceptions of and activities conducted by elementary teachers toward the integration of agriculture into the curriculum.

Purpose and Objectives

The purpose of this study was to describe the relationships of selected demographic variables, activities conducted, and perceptions held by elementary teachers (K through 6) in a selected seven county area in east central Iowa. The three objectives of this study were: (1) To identify relationships among selected demographic variables of elementary school teachers' perceptions related to the integration of agriculture in elementary curricula, agricultural awareness, and the agricultural industry; (2) to identify relationships among selected variables as to the extent of agricultural awareness activities were conducted by elementary teachers; and, (3) to identify relationships among the perceptions domains and the agricultural awareness activities conducted (behavior) domain.

Methods and Procedures

The target population of this study was elementary teachers in a seven county educational service area in east central Iowa. There were 52 school districts in the target population. The districts ranged in size from very small with six students to the second largest school district in Iowa with over 17,000 students. The mean size of the school districts in the sample was 5,725 students per district. The Grant Wood Area Education Agency mailing list of teachers served as the frame. There were 2,067 teachers in the frame who taught in 33 public school districts and 19 private school districts. An equal-probability-of-selection method sample of 689 teachers was selected using a systematic sampling method (Babbie, 1990). Forty-five percent of the teachers (311/689) returned the questionnaire. Since some questionnaires were returned blank or partially completed, the data sample consisted of 281 questionnaires (41% response rate).

The instrument used to collect the data of this study was a mailed questionnaire containing 90 items in four parts. The researchers created the instrument. Part A contained 31 items related to beliefs about integrating agriculture into elementary classes representing three conceptual domains: (1) Integration of Agriculture; (2) Agricultural Awareness; and, (3) The Agricultural Industry. Perceptions were measured using a 5 point summated rating scale. Teachers were asked to respond to each statement using the following rating scale: Strongly Disagree (SD = 1), Disagree (D = 2), Neutral (N = 3), Agree (A = 4), and Strongly Agree (SA = 5). Part B contained 48 items regarding agricultural activities in the classroom. The activities related to general agriculture and the seven career areas of agriculture—agricultural mechanics, agricultural processing, agricultural production, agricultural sales and services, forestry, horticulture, and natural resources and conservation (Newcomb, McCracken, & Warmbrod, 1993). The teachers were asked to respond to the number of times which they had conducted the activities in their instruction during the past year. Their choices were: Never = 0, Once a year = 1, Twice a year/once a semester = 2, and Three or more times a year = 3. Part C contained one open-ended question used to ascertain other comments regarding the teachers' thoughts and ideas about teaching agriculture in the elementary classes. Part D contained ten items related to demographic information.

Content and face validity was established from a panel of elementary teachers, a school superintendent, a professional accountant, and faculty members of the Department of Agricultural Education and Studies at Iowa State University. Items related to the agricultural activities were teaching ideas developed by elementary teachers in the Teachers' Academy on Agricultural Awareness workshops. The estimates of reliability, using Cronbach's alpha, were 0.88 for the items related to Integration of Agriculture, 0.86 for the items related to Agricultural Literacy and Awareness, and 0.85 for the items related to the Agricultural Industry (Nunnally, 1967).

Questionnaires were sent to the elementary teachers at their school addresses. A follow-up postcard was sent as a reminder 10 days after the initial mailing. One plausible reason for the lower response rate was because there was not enough time to send subsequent follow-up reminders due to the end of the school year. Non-response error was controlled by the "double-dip" method (Miller & Smith, 1983). Five percent of the non-respondents were randomly sampled. Their responses were compared to respondents using summated means. T-tests indicated no significant differences between the non-respondents' and respondents' responses on ten randomly selected items.

Descriptive inferential statistics were used to analyze the data sample. The data set was analyzed using SPSS. Negatively worded items were reverse coded in the summations of the conceptual domains. Means were calculated for composite scores. Means and standard deviations of the conceptual domains were calculated from the means of the items to assess the overall attitude of elementary teachers toward the integration of agriculture, agricultural awareness, and the agricultural industry. Summated means were calculated for the domain of agricultural awareness activities conducted. Relationships involving categorical variables and dependent variables were described using point bi-serial and eta coefficients; means and standard deviations were reported with each coefficient. Means were compared using t-tests, with alpha set at .05 a priori, to interpret the relationships for the categorical variables and the dependent variables. Relationships involving numerical variables were described using the Pearson product-moment coefficient.

Results and Findings

Ninety percent (n = 274) of the teachers were female and 10 percent were male (n = 27). Sixty-two percent (n = 171) of the teachers had a bachelor's degree and thirty-eight percent (n = 103) of the teachers had a master's degree. The grade levels taught by the elementary teachers were divided into kindergarten through second grade (50%); third to fourth grade (34%); and fifth to sixth grade (34%). The years of teaching experience of the teachers in the sample were evenly distributed among the categories of teaching experience. Thirty-nine elementary teachers (14%) had taken agricultural classes, workshops, or in-service programs. One hundred fifty-six elementary teachers (56%) had agricultural experience. One hundred twenty-one elementary teachers (43%) had an agriculture teacher in their school district. Half of the teachers (n = 136) in the sample taught in rural community; one-fourth (n = 67) taught in a metropolitan community; and one-fourth (n = 67) taught in an urban community. Many teachers taught more than one grade level and more than one subject. The elementary teachers taught a wide array of subjects (Knobloch & Martin, 1998).

Elementary teachers had positive perceptions regarding integrating agriculture into the elementary curriculum, the need for agricultural awareness in their education, and the need for the agricultural industry (Table 1). The Integration of Agriculture domain represented items related to the integration of agriculture into the elementary curriculum, e.g., agriculture would enhance the curriculum; there is no time to teach agriculture in the elementary curricula; agriculture can be taught in any subject matter area; and, elementary school teachers are not trained to teach agriculture. The mean of this domain was 3.75 (SD = 0.44). The Agricultural Awareness domain represented items related to the need for students to learn about agriculture, e.g., basic knowledge of agriculture is important to make daily decisions; every elementary student should be taught agriculture no matter what career they want to pursue; every junior high/middle school student should be taught agriculture no matter what career they want to pursue; and, every high school student should be taught agriculture no matter what career they want to pursue. The mean of this domain was 3.50 (SD = 0.64). The Agricultural Industry domain represented items that related to the teachers' perceptions of the agricultural industry, e.g., agriculture includes horticulture and floriculture; there is no future in agriculture; agriculture is America's largest employer; and, agriculture is an environmentally conscious industry. The mean of this domain was 3.97 (SD = 0.39).

In regards to agricultural activities conducted, elementary teachers were asked the extent to which they conducted agricultural awareness activities in their curriculum. Over half of the 48 activities listed in the questionnaire were conducted by a majority of the teachers at least once during the school year. Some examples of the activities were recycled paper and discussed renewable resources; discussed an agricultural issue about the environment; viewed birds or wildlife; identified types of trees in a forest; and, identified the ingredients from a food label.

Table 1. Perceptions of elementary teachers regarding integration of agriculture, need for agricultural awareness, and need for the agricultural industry (n = 281)

Domain	*No. of Items*	*Mean*	*Standard Deviation*
Integration of Agriculture	14	3.75	0.44
Agricultural Awareness	4	3.50	0.64
Agricultural Industry	13	3.97	0.39

Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Two hundred twenty-eight teachers (81%) indicated that they had conducted agricultural activities in their instruction at least once during the school year. The mean was 0.80 (SD= 0.46, n=272).

For the correlations, nine demographic variables were selected for the study: (1) gender; (2) degree of education; (3) grade levels taught; (4) years of teaching experience; (5) agricultural classes, workshops, or in-service programs taken; (6) agricultural experience; (7) agriculture teacher in the school district; (8) type of community; and, (9) school district enrollment. The coefficients among the matrix of relationships (Davis, 1971) ranged from being negligible (.006) to low (.211) of the nine demographic variables, the three perception domains, and the behavior domain (Table 2). In Table 3, the coefficients for the relationships of the 3 perception domains and the behavior domain ranged from low (.171) to moderate (.584).

Although coefficients were identified with asterisks as being significant (alpha = .05), relationships that were practically significant were discussed. Practical significance was determined to be moderate relationships with a coefficient of .30 or higher (Davis, 1971), or when about 10 percent of the variance can be explained. Therefore, there were no or low relationships among the demographic variables and the perception domains of the integration of agriculture, agricultural awareness, and the agricultural industry. Further, there were no and low relationships among the demographic variables and the agricultural activities conducted domain. However, there was one substantial relationship and there were three moderate relationships among the perception and behavior domains.

First, there was a substantial positive relationship ($r = .584$) between the Integration of Agriculture and Agricultural Awareness domain. With 95 percent confidence it is estimated that in the population of elementary teachers in the Grant Wood Area Education Agency the relationship between their perception of integrating agriculture and their perception of the need for agricultural awareness was positive with a magnitude within the range .50 - .86. Second, there was a moderate positive relationship ($r = .482$) between the Agricultural Awareness and Agricultural Industry domains. With 95 percent confidence it is estimated that in the target population of elementary teachers the relationship between their perception of the need for agricultural awareness and their perception of the agricultural industry is positive with a magnitude within the range of .39 - .58. Third, there was a moderate positive relationship ($r = .477$) between the Integration of Agriculture and Agricultural Industry domains. With 95 percent confidence it is estimated that in the target population of elementary teachers, the relationship between their perception of integrating agriculture and their perception of the agricultural industry is positive with a magnitude within the range .38 - .57. Fourth, there was a moderate positive relationship ($r = .370$) between the Integration of Agriculture and Activities Conducted domains. With 95 percent confidence it is estimated that in the target population of elementary teachers, the relationship between their perception of integrating agriculture and the extent of agricultural activities conducted in their instruction is positive with a magnitude within the range .26 - .47.

Table 2. Relationships of Selected Demographic Variables of Elementary Teachers and the Perception and Behavior Domains

Independent Variables	*Dependent Variables (Domains)*			
	Perceptions			*Behavior*
	Integration of Agriculture	***Agricultural Awareness***	***Agricultural Industry***	***Activities Conducted***
Gender	.004	-.055	-.035	.078
Male	3.74 (.47)	3.61 (.70)	4.01 (.47)	.69 (.48)
Female	3.75 (.44)	3.49 (.63)	3.97 (.38)	.81 (.45)
	n=277	n=281	n=281	n=272
Degree of education	.042	-.078	-.092	.138*
B.A./B.S.	3.73 (.39)	3.54 (.63)	3.92 (.45)	.76 (.48)
M.A./M.S.	3.77 (.44)	3.43 (.65)	3.97 (.39)	.89 (.41)
	n=270	n=274	n=274	n=265
Grades taught	.154	.006	.075	.201*
K-2	3.83 (.44)	3.52 (.68)	3.97 (.38)	.94 (.44)
3-4	3.73 (.41)	3.51 (.66)	4.04 (.37)	.79 (.39)
5-6	3.68 (.42)	3.51 (.56)	3.97 (.42)	.74 (.49)
	n=240	n=244	n=244	n=237
Experience (years)	.089	.092	.049	.101
0-7	3.80 (.41)	3.45 (.78)	4.00 (.38)	.78 (.51)
8-14	3.76 (.39)	3.60 (.61)	3.95 (.35)	.91 (.45)
15-21	3.79 (.41)	3.55 (.60)	3.98 (.37)	.84 (.42)
22 or more	3.71 (.47)	3.46 (.61)	4.00 (.44)	.82 (.43)
	n=241	n=245	n=245	n=238
Agricultural classes	.144*	.073	.013	.211*
Yes	3.72 (.43)	3.49 (.62)	3.97 (.37)	.76 (.43)
No	3.90 (.44)	3.62 (.77)	3.98 (.53)	1.04 (.53)
	n=276	n=280	n=280	n=271
Agricultural	.187*	.165	.087	.189*
experience	3.65 (.42)	3.39 (.66)	3.93 (.42)	.71 (.43)
Yes	3.82 (.44)	3.60 (.61)	4.00 (.37)	.88 (.46)
No	n=277	n=281	n=281	n=272
Agriculture teacher	-.010	.085	.112	-.024
Yes	3.75 (.42)	3.46 (.60)	3.93 (.38)	.81 (.43)
No	3.74 (.47)	3.57 (.68)	4.02 (.40)	.79 (.49)
	n=277	n=281	n=281	n=272

Table 2. Continued

Type of community	.150	.168*	.147	.021
Rural	3.82 (.44)	3.61 (.66)	4.02 (.38)	.85 (.48)
Metropolitan	3.75 (.39)	3.47 (.62)	4.00 (.42)	.83 (.42)
Urban	3.66 (.41)	3.35 (.59)	3.88 (.37)	.85 (.43)
	n=235	n=239	n=239	n=232
School district enrollment	-.094 n=271	-.130* n=275	-.125* n=275	.018 n=266

Note. * The coefficient is significant at α = .05.

Table 3. Relationships of Perception and Behavior Domains

	Numerical Variables			
	Perception Domains			*Behavior*
	Integration of Agriculture	***Agricultural Awareness***	***Agricultural Industry***	***Activities Conducted***
Integration of Agriculture	1.000	.584* n=277	.477* n=277	.370* n=269
Agricultural Awareness	---	1.000	.482* n=281	.293* n=272
Agricultural Industry	---	---	1.000	.171* n=272
Activities Conducted	---	---	---	1.000

Note. * The coefficient is significant at α = .05.

Conclusions, Recommendations, and Implications

The conclusion that elementary teachers with positive perceptions of integrating agriculture in their curriculum were more likely to conduct agricultural activities in their classrooms supported research conducted by Rudd and Hillison (1995), who found that teachers' attitudes related to the amount of new curriculum that was taught. In pursuing another avenue of theory, this conclusion was congruent with Fishbein and Ajzen's (1975) theory, which supports the implication that elementary teachers with positive beliefs about the consequences of integrating agriculture and positive normative beliefs about agricultural awareness and the agricultural industry leads to positive attitudes and subjective norms, thus, leading to intentions and behaviors of integrating agriculture into their instruction. Furthermore, elementary teachers with positive perceptions of integrating agriculture were more likely to perceive the need for agricultural awareness and the agricultural industry positively. Therefore, elementary teachers who perceived the need for agricultural awareness were more likely to perceive the agricultural industry positively. Furthermore, teachers who perceived the agricultural industry positively were more favorable towards the integration of agriculture into the curriculum. These conclusions also supported Fishbein and Ajzen's (1975) theory. Further, the elementary teachers' positive perception of the integration of agriculture in their curriculum tenably explains why many teachers conducted agricultural activities in their instruction.

Elementary teachers in this study had positive perceptions of agriculture being integrated into elementary classes. This finding supported the recommendation that agriculture should be integrated in the elementary curriculum (Birkenholz, Frick, Gardner, & Machtmes, 1994; DeChristopher, 1993; Dewey, 1938; Frick, Birkenholz, & Machtmes, 1995; Leising & Zilbert, 1994; Lucht, 1993; National Research Council, 1988; Terry, Herring, & Larke, 1992). However, the finding of low and no relationships among agricultural classes, workshops, or in-service programs taken and the perception and behavior domains was not congruent with the findings of Balschweid, Thompson, and Cole (1998) and Trexler and Suvedi (1998), who found that teachers conducted more agricultural activities in their instruction after in-service intervention programs. Furthermore, the finding of low and no relationship among agricultural experience and the perception and behavior domains was not supported by the findings of Terry, Herring, and Larke (1992) and Humphrey, Stewart, and Linhardt (1994), who found that teachers with agricultural experience had more accurate perceptions of agriculture.

The findings and conclusions of this study should be considered in the development of intervention programs for pre-service and in-service teachers by teacher education programs, agriculture teachers, and state department of education consultants. For example, demographic variables of elementary teachers do not matter related to their perceptions and behaviors of integrating agriculture into the curriculum, but what does matter are their perceptions of integrating agriculture into the curriculum, the need for agricultural awareness, and the agricultural industry, related to the extent they conducted agricultural activities in their instruction. Moreover, commodity organizations, agricultural promotion groups, and elementary education programs such as Agriculture in the Classroom and Food, Land, and People should consider the conclusions of this study in developing resources and programs that elementary teachers need and use in integrating agriculture into their curriculum. For example, these organizations and groups should collaborate with agricultural educators, such as professors and state specialists, who are experts in agricultural awareness and literacy in developing resources and curriculum materials. Agricultural educators at the local level should develop relationships and collaborate with elementary teachers to integrate agriculture into their instruction such as team-teaching mini-units, collaborating on special projects, or coordinating local community programs.

This study should be replicated in other states to determine if the findings vary because of geographical differences. Further, this study should be replicated in the future to determine if the economic and societal influences change normative beliefs of elementary teachers. This study should also be conducted to measure the changes in attitudes and behaviors after an intervention program related to agricultural awareness or agricultural literacy has been implemented. Further, data should be collected to assess why elementary teachers believe that agriculture should or should not be integrated into their instruction. Research should be continued in the development of an instrument that would predict elementary teachers' behaviors towards integrating agriculture into their instruction based on their perceptions. Future research studies should be conducted to identify barriers to integrating agriculture into the elementary curriculum and to describe student achievement associated with the integration of agriculture in the elementary curriculum.

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Relationships of Elementary Teachers' Perceptions and Activities Conducted Regarding the Integration of Agricultural Awareness Activities into the Curriculum

A Critique

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This paper adds to the growing inventory of studies regarding the integration of agricultural content into the elementary curriculum. Using a mailed questionnaire to gather data that measured teachers' perceptions, the researchers found that elementary teachers in east central Iowa had positive perceptions regarding integrating agriculture into their curricula, their need for agricultural awareness, and the need for the agricultural industry.

This study provides a solid conceptual framework for the research conducted. The literature review was rather comprehensive, ranging from those conducted by agricultural educators in recent decades on the need for instruction about agriculture in elementary grades to John Dewey's philosophic exhortations to teach scientific knowledge with everyday social applications and problem solving through real-life experiences. Appropriate research methods and procedures were used. The population was clearly defined and an adequate sample was selected and surveyed. Non-response error was carefully controlled. The latter was especially important, given a relatively low usable response rate of 41%. The data were analyzed in an appropriate manner.

Although the purpose of the study was clearly stated, the objectives could have been stated with greater precision. The three objectives for the study require some creative thinking and editing by the reader before their intended meanings can be fully ascertained. The researchers recognized and acknowledged their low usable response rate, reasoning that their survey was conducted near the end of the school year and allowed little time for follow-up reminders. A mailed questionnaire containing 90 items to respond to seems to have been a rather weighty assignment for teachers at this time of year. Consequently, size of questionnaire might also have impacted the response rate.

In findings consistent with those of previous studies, the researchers found that elementary teachers with positive perceptions of integrating agriculture in their curriculum were more likely to conduct agricultural learning activities in their classrooms. However, perhaps surprisingly, it was concluded that demographic variables of elementary teachers do not matter when related to their perceptions and behaviors of integrating agriculture in the curriculum. What does seem to matter are those teachers' perceptions of integrating agriculture into the curriculum, the need for agricultural awareness, and the agricultural industry, related to the extent they conducted agricultural activities in their instruction. These findings both challenge those of several previous studies and support findings from others in this important area of agricultural education. The researchers are to be complimented for identifying some of the variables that need to be considered in developing intervention programs for elementary teachers. They also have made some excellent recommendations for further studies.

Principals' Perceptions of Integrating Science into Agriculture Programs

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Abstract

If integrating of science into the agricultural education curriculum is to be successful, there must be support from the school principal. Principals' perceptions were studied to determine their support for integrating science into agricultural education programs in Oregon. Secondary principals that had an Agricultural Science and Technology Program in their school were targeted for the study resulting in a 76.9% return rate.

Using a five point Likert-type scale, principals were asked to respond to statements concerning 1) integrating science and agriculture, 2) the role of teacher preparation programs in integrating science, 3) effects state standards will have on agricultural education programs, 4) teaching integrated science, 5) barriers to integrating science, and 6) support for integrating science. Principals also had the opportunity to respond to three open-ended questions regarding what should be given up to develop a more integrated science curriculum, factors causing programs to integrate science, and changes needed to meet state standards.

The data concluded that principals have responded positively to the call to integrate science into the agricultural education curriculum. Principals agreed that students were more aware of the connection between science and agriculture, students learn more about agriculture, and science concepts are easier to understand for students if science is integrated into the agricultural education curriculum.

A majority of the principals agreed that teacher preparation programs should provide instruction for undergraduates as well as teachers in the field, on how to integrate science. Principals agreed that student teachers and early field experience students should be placed in programs that integrate science. Principals supported an inservice activity for new teachers that required them to cooperate with a science teacher in their school district to integrate science.

Principals believed that integrating science in agricultural education programs would contribute to educational reform by helping students meet state standards. Alignment and integration are key changes principals listed to help programs meet state standards. The most common responses to what agricultural education programs would have to give up to develop a more integrated science curriculum were "nothing" and "traditional agriculture classes." Principals responded that meeting state standards and teacher initiative (or interest), inservice training, funding, and opportunities to integrate with a science teacher were the most common reasons to integrate science.

According to the principals, barriers to integrating science were lack of appropriate equipment, funds, and workshops. Moreover, principals agreed that administrator, science teacher, other teacher support, and parental support for agriculture programs will increase by integrating more science.

Introduction/Theoretical Framework

The American Educational system is currently undergoing reform in funding, governance, curriculum standards, staff development, assessment, and student support services (Fraser, 1996). Oregon set its course for improved student performance when the legislature passed the Oregon Educational Act of the 21st Century. The Act calls for raising student achievement by setting higher standards in curriculum, instruction, and accountability (Oregon Department of Education, 1998). The new standards specify what students should know and be able to do in English, math, science, social studies, the arts, second language, and career-related learning.

The pressures of increasing state standards have caused concern among many agricultural educators in Oregon. Increased high school graduation requirements have put pressure on agriculture programs by limiting opportunities for students to enroll in elective courses. Changing college entrance requirements have further challenged secondary agricultural educators to make their programs become more than just 'vocational'. Johnson (1995) reported that Arkansas teachers perceived that offering science credit for agriculture courses would increase enrollment, benefit students, and enhance the program image. Finn et al. (1998) contended that state standards would improve with time as states learn from each other. Raising standards for student achievement and increasing the knowledge and skills of graduates are occurring separately in most states (Koki, 1998).

Although science has been a part of agricultural education since the passage of the Hatch Act in 1887 (Budke, 1991; Vaughn, 1993; Christian & Key, 1994; Hillison, 1997), it wasn't until 1988 when the National Research Council gave a distinct charge to researchers to define methods necessary to guide educators as they updated their curriculum to make it more science based. Buriak (1992) defined agriscience as, "instruction in agriculture emphasizing the principles, concepts, and laws of science and their mathematical relationships supporting, describing, and explaining agriculture with a foundation in biological and physical science" (p. 4). Evidence exists that student performance increases when students are taught courses that integrate science and agriculture (Roegge & Russell, 1990).

Policymakers, educators, employers, scholars, and social critics have advocated vocational education reform that dealt with 'integration' (Stasz, Kaganoff, & Eden, 1994). According to researchers (Stasz and Grubb, 1991; O'Neil, 1992), vocational educators as well as critics of vocational education viewed integration of academics as a curricular reform that improved the academic content of vocational education and helped prepare students for employment in an ever-changing world of work.

School principals are key decision-makers in the curriculum at their high school and are influential in the continuation of the agricultural education program. Although they do not have full control over curriculum, their influence has great impact and their perceptions of agriscience courses determine its success (Johnson and Newman, 1993).

With the implementation of the 1990 Carl D. Vocational Education and Applied Technology Act Amendments, there is commitment at the federal level for supporting the initiative to integrate academics and vocational education. More recently, the United States Department of Agriculture funded a competitive grants program designed to strengthen agricultural education with the specific intent to prepare more students to pursue careers in agriscience and agribusiness by incorporating agriscience into science, business, and consumer education programs (U. S. Department of Agriculture, 1999).

In the past decade, researchers (Kalme & Dyer, 1998; Johnson & Newman, 1993) have studied principals' perceptions of agricultural education programs. Johnson and Newman (1993) specifically studied principal's perceptions of integrating science and offering science credit for agriscience courses. The literature shows that principals viewed agricultural education on a scale between neutral and positive (Kalme & Dyer, 1998). While there is debate as to whether or not the initiative to integrate academics must come from top-down or bottom-up, there is little doubt that all levels of educational administration must support integrating academics if it is to be successful (Florida Department of Education, 1992).

Greenwald (1989) provided the theoretical framework for this study by concluding that individuals with positive attitudes toward a subject or situations tend to evaluate them positively. This suggested that support of principals toward integrating science could be measured by analyzing their beliefs about integrating science. If principals have a positive attitude toward integrating science, they will likely support the concept integrating science and the agriculture teacher's efforts to integrate science into the curriculum.

Purpose/Objectives

The purpose of this study was to determine how secondary principals in Oregon schools that had Agricultural Science and Technology (AST) perceived the impact of integrating science in agricultural education programs. To fulfill the purposes of the study, the following research questions were addressed:

1. What were selected demographic variables of principals in secondary schools that had an AST Program?
2. What were the perceptions of Oregon secondary principals concerning integration of science and agriculture?
3. What were Oregon secondary principals' perceptions concerning the role of teacher preparation programs in integrating science?
4. What effects will state standards have on agricultural education programs as perceived by Oregon principals?
5. What were the perceptions of Oregon secondary principals concerning teaching integrated science?
6. What were the perceived barriers to integrating science in the agricultural education program?
7. What were Oregon secondary principals' perceptions concerning support of the agricultural education program since integrating science?

Methods/Procedures

The target population for this study consisted of current secondary principals that had an Agricultural Science and Technology Program in their district. The list of schools offering Agricultural Science and Technology Programs and the names and addresses of principals were obtained in the Oregon School Directory (Oregon Department of Education, 1999). Caution should be exercised when generalizing the results of the study beyond the accessible sample.

The Integrating Science Survey Instrument developed by Thompson and Schumacher (1997) was used to identify the perceptions of the principals. Three additional questions were added to the survey to acquire state specific information. The authors (Thompson and Schumacher, 1997) established reliability (Cronbach's alpha = .88 pilot study, and .81 Instrument) and validity of the instrument. The survey instrument was pilot tested by seven principals that had previously been principals in a school that had an Agricultural Science and Technology Program. Cronbach's alpha for reliability of the instrument for the secondary principals in the study was .893.

The survey instrument and cover letter were mailed to the subjects. Two weeks after the initial mailing, a second mailing was sent to all non-respondents and finally two weeks after the second mailing was sent, a telephone call was placed to all non-respondents. Responses were received from principals for an overall response rate of 76.9%. Comparing early and late respondents on the mean attitude scales using a t-test showed the attitude means were not statistically significant.

Results/Findings

The average respondent was 49 years of age (SD = 8.62), had 13 years of experience as a high school principal (SD = 7.42) and had served approximately 4.5 years as principal at their current school (SD = 5.78). While 81% of the respondents were male, 16% were female. Over 19 % of the respondents had been enrolled in agricultural education while in high school. Forty-four (44%) percent of the respondents indicated their students received science credit for agricultural education classes in their school.

The respondents were asked to respond to 42 statements regarding integrating science into their Agricultural Education Programs. Their responses were measured using a five point Likert-type scale where 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

Table 1 presents the principals' perceptions of integrating science and agriculture. The majority of principals agreed or strongly agreed with all of the statements (over 50%) in research question number two. Principals felt students are more aware of the connection between scientific principles and agriculture (96.1% agreed or strongly agreed), and people must have a greater understanding of biological (89.5% agreed or strongly agreed), and physical (80% agreed or strongly agreed) science than ten years ago. Principals agreed or strongly agreed that students will learn more about agriculture when science concepts are an integral part of instruction (84.2%), science concepts will be easier to understand (76.3%), and students will be better prepared in science (71.1%) if science is integrated into the agriculture curriculum. Over half (51.3%) of the principals agreed or strongly agreed that students are more motivated to learn if science is integrated into the agricultural education program.

Table 1

Principals' Perceptions of Integrating Science and Agriculture (N = 76)

Agriculture and Science Item	SA %	A %	N %	D %	SD %
Students are more aware of the connection between scientific principles and agriculture when science concepts are an integral part of their instruction.	48.7	47.4	2.6	1.3	0
	96.1[a]			1.3[b]	
People pursuing a career in agriculture must have a greater understanding of biological science than ten years ago.	51.3	38.2	10.5	0	0
	89.5[a]			0[b]	
Students learn more about agriculture when science concepts are an integral part of their instruction.	39.5	44.7	15.8	0.0	0.0
	84.2[a]			0[b]	
People pursuing a career in agriculture must have a greater understanding of physical science than ten years ago.	38.7	41.3	18.7	1.3	0
	80.0[a]			1.3[b]	
Science concepts will be easier to understand for students if science is integrated into the agricultural education program.	25.0	51.3	21.1	1.3	1.3
	76.3[a]			2.6[b]	
Students will be better prepared in science after they completed a course in Agric. Ed. that integrated science.	30.3	40.8	23.7	2.6	2.6
	71.1[a]			5.2[b]	
Students will be more motivated to learn if science is integrated into the agricultural education program.	17.1	34.2	40.8	6.6	1.3
	51.3[a]			7.9[b]	

[a] Strongly agree and agree combined

[b] Strongly disagree and disagree combined

Two open-ended questions were asked to principals regarding integrating science into the agricultural education program. Principals were asked what had to be given up or what has been given up to develop a more integrated science curriculum and the most significant factor that will cause or has caused Agricultural Education Programs to integrate science. Of the fifty-nine responses, the most common response to what agricultural education programs would have to give up was "nothing" (35 responses), followed by traditional agriculture classes (15 responses), and "time" (5 responses). The most commonly listed items (76 responses) that caused or will cause the respondents to integrate science were to meet state standards (19 responses), teacher initiative and/or interest (13 responses), inservice training (8 responses), funding (7 responses), and opportunities to integrate with a science teacher (6 responses).

Research question number three contained six items designed to address the principals' perceptions regarding the role of teacher preparation programs in assisting teachers in integrating science (Table 2). The principals agreed or strongly agreed that teacher preparation programs should provide instruction for undergraduates (96% agreed or strongly agreed) and inservice for teachers (94.6% agreed or strongly agreed) on how to integrate science into the Agricultural Education Program. Almost three fourths of the respondents agreed or strongly agreed (74.6%) that teacher preparation programs should place student teachers with a cooperating teacher that integrates science and pre-service teachers should be required to take more science courses in their undergraduate program (74.3% agreed or strongly agreed). Sixty-four percent (64%) of the principals agreed or strongly agreed that teacher preparation programs should require a follow-up activity requiring agriculture teachers to cooperate with science teachers in their school district to integrate science. Almost 63% of the principals agreed or strongly agreed that early field experience should be conducted with an agriculture teacher that integrates science.

Table 2

Principals' Perceptions Concerning the Role of Teacher Preparation Programs in Integrating Science in Agricultural Education Programs (N = 76)

Teacher Preparation Programs Item	SA %	A %	N %	D %	SD %
Teacher prep. Programs in agriculture should provide instruction for undergraduates on how to integrate science.	38.7	57.3	4.0	0	0
	96.0[a]			0[b]	
Teacher prep. Programs should provide inservice for teachers in the field on how to integrate.	33.3	61.3	5.3	0	0
	94.6[a]			0[b]	
Teacher preparation programs should place student teachers with a cooperating teacher that integrates.	25.3	49.3	24.0	1.3	0
	74.6[a]			1.3[b]	
Teacher preparation programs in agriculture should require students to take more basic science courses.	21.6	52.7	20.3	5.4	0
	74.3[a]			5.4[b]	
Teacher prep/ programs should have an inservice activity that requires AST teachers to cooperate with a science teacher in their district to integrate science.	21.3	42.7	28.0	8.0	0
	64.0[a]			3.0[b]	
Teacher preparation programs should require that students conduct their early field experience with a teacher that integrates science.	22.7	40.0	33.3	4.0	0
	62.7[a]			4.0[b]	

[a] Strongly agree and agree combined

[b] Strongly disagree and disagree combined

Research question number four (Table 3) contained three items that addressed state standards or Certificate of Initial Mastery (CIM) and Certificate of Advanced Mastery (CAM). Principals agreed or strongly agreed that integrating science will help align programs with educational standards (88.2%), support programs by helping students meet state requirements (85.5%) and be an asset to the agriculture program (69.8%).

Table 3
Principals' Perceptions Concerning State Standards (N = 76)

Meeting State Standards Item	SA %	A %	N %	D %	SD %
Integrating science will help align AST Programs with emerging educational standards (CIM/CAM).	32.9	55.3	10.5	1.3	0.0
	88.2[a]			1.3[b]	
Integrating science will support AST Programs by helping our students meet state standards (CIM/CAM).	34.2	51.3	11.8	1.3	1.3
	85.5[a]			2.6[b]	
State standards (CIM/CAM) will be an asset to what we are trying to do in our agriculture program.	31.6	38.2	17.1	9.2	3.9
	69.8[a]			13.1[b]	

[a] Strongly agree and agree combined
[b] Strongly disagree and disagree combined

Participants were asked to respond to an open-ended question concerning changes that AST Programs would have to go through to meet state standards (CIM/CAM). Of the 61 responses, most principals felt that curriculum alignment with state standards (17 responses), integrating science (16 responses), and nothing (13 responses) were the changes most often listed that respondents felt would have to be made to meet state standards.

Table 4 presents the principals' modal attitude toward teaching integrated science in agricultural education. Almost 63% of the respondents agreed or strongly agreed that integrating science requires more preparation time. Over half (50.7%) of the respondents agreed or strongly agreed that their agriculture teacher was prepared to teach integrated biological science concepts, while only 24% of the respondents agreed or strongly agreed that their agriculture teacher was prepared to teach integrated physical science concepts. Over half (53.4%) of the principals agreed or strongly agreed the agriculture teacher teaches integrated science concepts that focus more on the biological than the physical science concepts.

Table 4

Principals' Perceptions Toward Teaching Integrated Science in Their Agricultural Education Program (N = 76)

Teaching Integrated Science Item	SA %	A %	N %	D %	SD %
Integrating science into the agricultural education program requires more preparation time.	17.3	45.3	22.7	9.3	5.3
	62.6_a			14.6_b	
My agriculture teacher teaches integrated science concepts in agricultural education that focus more on the biological science concepts than the physical science concepts.	6.7	46.7	36.0	10.7	0
	53.4_a			10.7_b	
My agriculture teacher is prepared to teach integrated biological science concepts.	20.0	30.7	29.3	17.3	2.7
	50.7_a			20_b	
Integrating science into agriculture classes has increased our school's ability to teach students to solve problems.	6.7	32.0	53.3	6.7	1.3
	38.7_a			8.0_b	
My agriculture teacher has integrated more science in the advanced courses than the introductory courses.	1.4	35.1	37.8	23.0	2.7
	36.5_a			25.7_b	
My agriculture teacher is prepared to teach integrated physical science concepts.	13.3	22.7	40.0	21.3	2.7
	36.0_a			24.0_b	

$_a$ Strongly agree and agree combined

$_b$ Strongly disagree and disagree combined

Table 5 presents the principals' modal attitude toward barriers to integrating science into the agricultural education program. Over sixty-five percent (65.8%) of the respondents agreed or strongly agreed that lack of appropriate equipment is a barrier to integrating science and almost fifty-eight percent (57.9%) of the respondents agreed or strongly agreed that lack of adequate federal, state, or local funds is a barrier to integrating science. Almost fifty-eight percent (57.9%) of the principals agreed or strongly agreed that a lack of agriscience workshops for agriculture teachers is a barrier to integrating science. Principals disagreed or strongly disagreed (52.7%) that lack of agriscience jobs in the local community is a barrier to integrating science.

Table 5
Perceived Barriers to Integrating Science In Agricultural Education Programs (N = 76)

Barriers Item	SA %	A %	N %	D %	SD %
Lack of appropriate equipment is a barrier to integrating science into agricultural education programs.	21.1	44.7	17.1	13.2	3.9
	65.8[a]			17.1[b]	
Lack of agriscience workshops for agricultural education teachers is a barrier to integrating science.	17.1	40.8	26.3	13.2	2.6
	57.9[a]			15.8[b]	
Lack of adequate federal, state, or local funds is a barrier to integrating science into agricultural education programs.	17.1	40.8	18.4	18.4	5.3
	57.9[a]			23.7[b]	
Lack of science competence among teachers in agricultural education is a barrier to integrating science.	9.2	40.8	30.3	28.9	3.9
	50.0[a]			19.7[b]	
Lack of close proximity to high-technology firms is a barrier to integrating science in agricultural education programs.	15.8	22.4	28.9	28.9	3.9
	38.2[a]			32.8[b]	
Lack of an integrated science curriculum is a barrier to integrating science into the agricultural education program	7.9	28.9	28.9	26.3	7.9
	36.8[a]			34.2[b]	
Lack of student preparation (prior to enrolling in agricultural education) in science is a barrier to integrating science.	2.6	25.0	25.0	39.5	7.9
	27.6[a]			47.4[b]	
Lack of agriscience jobs in the local community is a barrier to integrating science in the agricultural education program.	6.6	18.4	22.4	39.5	13.2
	25.0[a]			52.6[b]	
Lack of a science teacher who is willing to help me integrate science concepts has been a barrier to integrating science	5.3	17.1	31.6	36.8	9.2
	22.4[a]			46.0[b]	

[a] Strongly agree and agree combined
[b] Strongly disagree and disagree combined

Table 6 presents the principals' modal attitude toward program support for the agricultural education program. A majority of the principals agreed or strongly agreed that local administrator support (67.1% agreed or strongly agreed), that science teacher support (60.5% agreed or strongly agreed), and other teacher support (51.3% agreed or strongly agreed) will increase by integrating more science into the agricultural education program. The majority of principals (52.7%) agreed or strongly agreed that parental support will increase by integrating more science into the agricultural education program.

Table 6
Principals' Perceptions Concerning Program Support of Integrating Science into Their Agricultural Education Program (N = 76)

Program Support Item	SA %	A %	N %	D %	SD %
Local administrator support will increase by integrating more science into the agricultural education program.	13.2	53.9	22.4	10.5	0
	67.1[a]			10.5[b]	
Science teacher support will increase by integrating more science into the agricultural education program.	11.8	48.7	30.3	6.6	2.6
	60.5[a]			9.2[b]	
Parental support will increase by integrating more science into the agricultural education program.	6.6	46.1	38.2	9.2	0.0
	52.7[a]			9.2[b]	
Other teacher support has/will increase(d) by integrating more science into the agricultural education program.	7.9	43.4	38.2	9.2	1.3
	51.3[a]			10.5[b]	
Community support will increase by integrating more science into the agricultural education program.	9.2	39.5	42.1	7.9	1.3
	48.7[a]			9.2[b]	
School counselor support will increase by integrating more science into the agricultural education program.	7.9	38.2	43.4	9.2	1.3
	46.1[a]			10.5[b]	

[a] Strongly agree and agree combined
[b] Strongly disagree and disagree combined

Conclusions/Recommendations/Implications

If integration of science into the agricultural education curriculum is to be successful on the secondary level, there must be support from the principal. This study provided base-line data to ascertain the perceptions of principals toward integrating science and can be used to assist agriculture teachers, the state department of education, and teacher preparation programs in making decisions toward curriculum changes. Administrator support is an important aspect of program development and expansion. Therefore, this study may be useful in making decisions to provide inservice and curriculum changes in Agricultural Science and Technology Programs.

The data concluded that principals in this study have responded positively to the call of integrating science into the agricultural education curriculum. Philosophically, principals can see the value that integrating science in agricultural education programs will benefit student learning. A majority of secondary principals that oversee Agricultural Science and Technology Programs were in agreement that students were more aware of the connection between science and agriculture, that students learn more about agriculture, and science concepts are easier to understand for students if science is integrated into the agricultural education program.

This study will assist teacher preparation programs in planning curriculum for pre-service teachers and inservice activities for practicing teachers. A compilation of principals and teachers' perceptions (Thompson & Balschweid, 1999) will give leaders in agricultural education information to assist in redesign efforts to meet the demands of educational reform in Oregon. Principals agreed that student teachers and early field experience students should be placed in programs that integrate science. Teacher preparation programs can use the data to assist in making the decision to develop an inservice activity for new teachers that requires them to cooperate with a science teacher in their school district to integrate science.

Will agricultural education programs survive this round of education reform and state standards? How do principals view Agricultural Education Programs' contribution to educational reform? The principals in this study felt that integrating science will help students meet the standards in Oregon's Certificate of Initial Mastery (CIM) and Certificate of Advanced Mastery (CAM). Principals believe that integrating science will help align programs to meet state standards and teachers should continue their work to align with state standards. Principals feel that alignment and integration are key changes that will have to be made in Agricultural Education Programs to meet state standards. Practicing teachers can learn from the data of this study by understanding the perceptions of principals toward integrating science.

The data indicated principals agreed that administrator, science teacher, other teacher and parental support for the agriculture program will increase by integrating more science. It can be noted that principals understand that more preparation time is needed to integrate science and therefore, they may be more supportive to the time commitment involving integrating science. However, knowing that principals believe teachers integrate more biological than physical sciences and are more prepared to teach integrated biological than physical sciences will provide teachers with the understanding of how the majority of principals perceive biological and physical sciences. Teachers may need to highlight their knowledge in physical sciences and how their agricultural mechanization program emphasizes physical science concepts. Agriculture teachers should benefit from administrative involvement in curricular advancement.

At the same time, agriculture teachers need to do more to educate principals about the need for integrating science into the curriculum and the benefits to students and the school system. This study sought to investigate the perceptions of Oregon principals in high schools that had Agricultural Science and Technology Programs. The data presented serves as a benchmark for identifying principals' perceptions of barriers, enrollment issues, program support, state standards, the role of teacher preparation programs, and their perception of teaching integrated science concepts in agricultural programs.

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Principals' Perceptions of Integrating Science into Agriculture Programs

A Critique

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The success of curriculum reform efforts typically hinges on the perceptions and subsequent actions of school administrators. In this study, integration of science into the agricultural education curriculum is the reform being sought, and the perceptions of secondary school principals toward this effort in Oregon are the focus of the research. The researcher is to be commended for selecting a topic of great importance to agricultural educators nationally and for surveying the perceptions of a key potential catalyst (or gatekeeper) in any educational system, the high school principal.

This paper is well organized and includes as excellent review of literature related to the study. The theoretical framework is presented clearly, pivoting on the rationale that "if principals have a positive attitude toward integrating science, they will likely support the concepts [of] integrating science and the agriculture teacher's efforts to integrate science into the curriculum." Both purpose and the research questions to be addressed were logically defined and pursued. Appropriate research methods and procedures were used. The target population was all secondary principals of schools that had an Agricultural Science and Technology (AST) Program. The Integrating Science Survey Instrument, which the author developed in 1997, was augmented with three additional questions. Reliability and validity were established. Over three-quarters of the population responded, and non-response error was controlled for those who did not. In short, this was a well designed and implemented study.

A few concerns or questions come to mind, however, as one reflects upon the conclusions, recommendations, and implications of the study--several of which the researcher, himself, has raised. Even though the tabular data indicate that one-half of the responding principals perceived (strongly agree/agree) that "Lack of science competence among teachers in agricultural education is a barrier to integrating science," the author omitted any comment on this finding. Perhaps this is a case of the "glass being half full or half empty," depending on one's perspective; however, it is a measure of the principals' perceived level of science competence of their AST (agriculture) teachers. This reserved assessment of AST teacher competence in science ranged from approximately one-half (49%) of the principals implying their teachers weren't prepared to teach integrated biological science concepts (neutral to strongly agree) to nearly two-thirds (64%) with similar reservations about their AST teachers' preparation for teaching integrated physical science concepts. The author did acknowledge the perceptual difference reported by principals that AST teachers are better prepared to integrate biological science than physical science, suggesting that "Teachers may need to highlight their knowledge in physical sciences and how their agricultural mechanization program emphasizes physical science concepts." A very useful benchmark study!

Value of Scheduling-Related Inservice Education, Opportunity to Implement Effective Instructional Practices, and Performance of Block-Scheduled Learners in Agricultural Science: A Correlational Study

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Abstract

Student learning is an ultimate aim of education; teachers must be prepared to facilitate that learning. Preservice and inservice education provides teachers with skills and knowledge necessary to facilitate learning. Similarly, school climate and organization affects student learning. Block scheduling, an organizational tool adopted by many schools, has as its ultimate intent the improvement of student achievement. As an innovation, block scheduling must be understood and used by teachers as they organize instruction to enhance learning. However, to do these best, teachers must receive instruction themselves on how best to use block scheduling. Another factor also related to student achievement might be teacher satisfaction. Moreover, teacher satisfaction has been linked to school climate—with one piece of school climate being school-day schedule.

A primary purpose of this study was to examine relationships among teacher inservice in preparation for the school-day schedule—a block schedule, teacher satisfaction with the opportunity to implement effective teaching strategies (instructional practices), and their students' achievement. Twenty-two volunteer teachers and schools, representing two different school-day scheduling patterns, i.e., 12 Modified A/B Block scheduled schools with 189 students and 10 Nine-Week (4X4) Block scheduled schools with 136 students provided data for the study. Teachers completed a mailed questionnaire; each teacher administered an achievement examination to students in an animal science class taught by the teacher.

Findings were that the value of teachers' inservice education in preparation for their school-day schedule (i.e., a block schedule) was positively related to their satisfaction with opportunity to use effective instructional practices (teaching strategies). That is, as a teacher's rating of the value of their inservice preparation increased, so did their satisfaction with their opportunity to use effective teaching practices. Also, the value of teachers' inservice education in preparation for their school-day schedule was positively related to achievement of students in block-scheduled classes. So, as a teacher's value for their inservice preparation increased so did student achievement. This association was statistically significant and positive for lower-order thinking skills (LOTS), higher-order thinking skills (HOTS), and overall student achievement. Finally, teachers' satisfaction with opportunity to use effective instructional practices (teaching strategies) was positively related to achievement of students in block-scheduled classes. Therefore, as a teacher's satisfaction with opportunity to use effective instructional practices (under a block schedule) increased, so did their student's achievement. However, only in the case of HOTS achievement was the relationship statistically significant.

In the interest of improving achievement, teachers transitioning to a block schedule should receive inservice that supports the acquisition of teaching strategies identified as being effective when used under a block schedule.

Introduction and Theoretical Framework

If systematic and continuous improvement of student learning is an ultimate aim of education, then inservice education of teachers should prepare them to use effective instructional practices. Numerous researchers (Birman, Desimone, Porter, & Garet, 2000; Darling-Hammond & Falk, 1997; Darling-Hammond & McLaughlin, 1995; Hoyle, Steffy, & English, 1994) have supported this premise. Professional development might include assistance in developing teaching behaviors appropriate for an instructor's unique school setting. For example, if teachers are faced with professional challenges associated with changing their school-day schedule (e.g., to block scheduling), then inservice education can address their needs, and, assuming that new teaching behaviors are adopted and used properly, the ultimate result should be improved student achievement.

The transition to block scheduling is a reform that many teachers have undergone (Cawelti, 1997). The Modified A/B (Alternating Day) Block Schedule and the Nine-Week Accelerated (4X4) Semester Block Schedule are two principal patterns (Canady & Rettig, 1995). (On the Modified A/B Block Schedule, the school day is divided into four instructional blocks of approximately 90 minutes each. Students alternate class attendance between "A" day and "B" day classes, and they may be simultaneously enrolled for as many as eight different courses. On this schedule, most courses meet on alternate days for an 18-week semester. Conversely, on the Nine-Week Block Schedule, the school day is also divided into four instructional blocks of approximately 90 minutes each, but students attend the same four classes each day for one nine-week period.)

In the context of using time within a school-day schedule and how scheduling modifications can lead to improved teaching, DiRocco (1998/1999) asserted, "Intensive schedules [i.e., block scheduling] can be a powerful catalyst for change and for improved instruction in our secondary schools when implemented properly" (p. 83). Yet, Shortt and Thayer (1995) maintained that during this process of transformation the "behaviors that affect student learning and teacher behaviors need to be monitored and assessed so that adjustments can be made to maximize success for both teachers and students" (p. 61). Further, these researchers concluded: "How time is used in the classroom and what the relationship may be between classroom instructional time and learning are two variables that need additional study to determine the correlation between time and student achievement as they relate to block scheduling" (1998/1999, p. 81).

To date, investigators (Cobb, Abate, & Baker, 1999; Edwards & Briers, 1999; Louden, 1997; North Carolina Department of Public Instruction, 1996; York, 1997) who have examined effects of block scheduling on student achievement have produced ambivalent results. Researchers (Cobb et al., 1999; Edwards & Briers, 1999) have suggested that to further understand this phenomenon, there is a need to contrast different block schedules (e.g., alternating day formats versus nine-week 4X4 semester schedules) and to determine if there are variations related to differences in student performance.

However, perhaps inherent to the premise that significant gains in student learning can be realized are the behaviors of the teacher (i.e., instructional practices/teaching strategies) in the context of a reconfigured learning resource—a block-scheduled class. Further, how significant is the professional development that teachers receive to effectively implement teaching behaviors made possible by their schedule? That is, as a result of inservice, can teachers use instructional practices that enhance learner performance, including student gains in critical and higher-order thinking skills (Durkin, 1997; Kruse & Kruse, 1995; Lasley, 1998; Rettig & Canady, 1996; Shortt & Thayer, 1995; Watson, 1998). Shortt and Thayer (1995) stated that "any major change in a high school requires education of the faculty" (p. 60). Moreover, they maintained, "If block scheduling is to continue to provide unrestricted opportunities for students and teachers, opportunities must also be made available for teachers to grow professionally and sharpen teaching skills" (p. 60). Other researchers (Center for Applied Research and Education Improvement, 1995; Hackman, 1995; Irshmer, 1996) have echoed similar contentions—that for teachers to skillfully use a restructured school-day so that instructional practices associated with increased student performance can be planned, actualized, and assessed, related professional development must be carried out.

Moreover, is teacher satisfaction a fundamental component of the teaching-learning "equation"—one that cannot be overlooked? Hoyle et al. (1994) contend that the significance of satisfaction as it relates to work roles and work motivation, for example, psychological and hygienic "motivators" (satisfiers) and "dissatisfiers" identified by Herzberg and others, has been well documented. Researchers in agricultural education (Cano & Miller, 1992; Castillo & Cano, 1999a; Castillo & Cano, 1999b) have used the Motivator-Hygiene Theory as a basis for describing and exploring variables related to the "job satisfaction" of secondary-level agriculture teachers. However, Castillo and Cano (1999a) stated that "the relationship between level of...achievement of agricultural education students and their teacher's level of job satisfaction has not been explored" (p. 75). These investigators recommended that this association be examined.

Other theorists (Hoy & Miskel, 1991; Hoyle et al., 1994) have linked the phenomenon of teacher satisfaction to that of "school climate." Hoy and Miskel (1991) defined school climate as "a relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools" (p. 221). Buckman, King, and Ryan (1995) concluded that qualities comprising school climate, for example, "openness, trust, communication, and support shared by teachers," were "factors that encourage[d] learning for students and job satisfaction and improved performance for teachers" (p. 14). Yet, Hoyle et al. (1994) concluded, "In spite of the tremendous amount of energy expended by researchers of school climate, the exact effect of school climate on student achievement has yet to be determined" (p. 19). However, Hoy and Miskel (1991) identified "formal organization" (p. 221) as a significant variable influencing a school's climate. Arguably, school day schedule is a fundamental part of any school setting.

Assuming relevant inservice is provided, will teachers' perceptions of "value" for that inservice be related to their satisfaction with subsequent opportunity to implement new, different, or modified teaching strategies? Further, is there an association between instructors' perceived value of professional development preparing them to teach on a block schedule and subsequent achievement of their students? Finally, if teachers are "satisfied" with their school day schedule and feel satisfactorily prepared through inservice education to use effective instructional practices supported by their schedule, will student performance improve? See Figure 1.

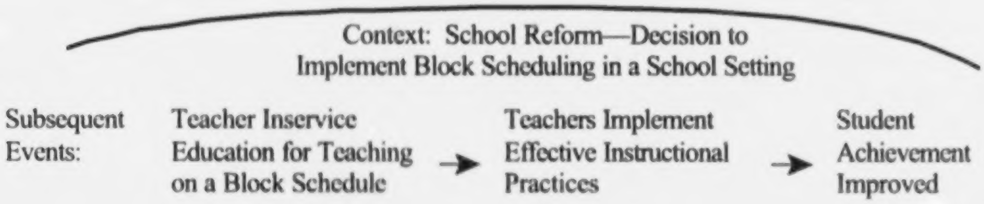
Context: School Reform—Decision to
Implement Block Scheduling in a School Setting
Subsequent Events:
Teacher Inservice Education for Teaching on a Block Schedule
Teachers Implement Effective Instructional Practices
Student Achievement Improved

Figure 1. Conceptual framework for school reform under block scheduling.

Purposes and Research Hypotheses

One purpose of the study was to describe selected characteristics of teachers and students in a secondary-level agriscience course (animal science) on a block-scheduled school day. Another purpose was to examine relationships among teacher inservice in preparation for the school-day schedule, teacher satisfaction with the opportunity to implement effective teaching strategies (instructional practices), and their students' achievement. The following research hypotheses were tested to accomplish this purpose:

H_1: The value of teachers' inservice education in preparation for their school-day schedule (block schedule) is positively related to their satisfaction with opportunity to use effective instructional practices (teaching strategies).

H_2: The value of teachers' inservice education in preparation for their school-day schedule is positively related to achievement of students in block-scheduled classes.

H_3: Teachers' satisfaction with opportunity to use effective instructional practices is positively related to achievement of students in block-scheduled classes.

Methods and Procedures

This was an ex post facto, descriptive-correlational study. The target population consisted of instructors teaching and students enrolled in the agriscience course Animal Science (AGSC 332) in Texas public schools during the fall of 1998. Schools that had offered/taught the course Animal Science (AGSC 332) for the school years 1996-97 and 1997-98 (n = 388) were obtained from the Texas Education Agency and served as the sampling frame. The responding sample consisted of 22 volunteer teachers and schools, representing two different school-day scheduling patterns, i.e., 12 Modified A/B Block scheduled schools with 189 students and 10 Nine-Week (4X4) Block scheduled schools with 136 students. A form of cluster sampling (Gall, Borg, & Gall, 1996) was used. That is, the experimental units were the individual agriscience classes and teachers, but individual students were the sampling units within an agriscience class. Because the data for this study were provided by a volunteer sample, the results are generalizable only to subsequent similar volunteer samples. An alpha level of .05 was used.

Teachers responded to a questionnaire with items describing themselves and their schools; one of the items asked teachers to rate the value of inservice education in which they had participated to prepare them to teach on their current school-day schedule. Responses ranged from "1," indicating "no inservice was provided" to "5," indicating that inservice education was "very valuable." Part two of the questionnaire included seven items about instructional practices conducive to implementation under block scheduling and associated with improved student achievement. In each of the seven statements, teachers indicated their level of agreement concerning whether or not their block schedule had afforded them opportunities to use these instructional practices (Edwards, 1999). This portion of the instrument was developed using Kruse and Kruse (1995), Lasley (1998), Rettig and Canady (1996), Shortt and Thayer (1995), and Watson (1998). A resulting scale—an average of the seven items—was used to indicate teacher satisfaction with their school day schedule in terms of its providing them with opportunities to use "approved" instructional practices. So, a score of "1" indicated "high dissatisfaction," to "5," indicating high satisfaction. Cronbach's coefficient alpha reliability estimate for the seven items assessing teachers' satisfaction with opportunity to implement effective instructional practices was .96.

The students completed a two-part instrument. Part one consisted of selected demographic items, e.g., length of FFA membership. The second part was an end-of-course achievement examination. It was developed from recommended curriculum materials for the agriscience course Animal Science (AGSC 332) (Instructional Materials Service, n.d.). Three agricultural educators—a curriculum specialist, a classroom teacher, and a measurement specialist, reviewed the items for clarity and content. The examination included 56 multiple-choice items and was divided into two scales based on the "levels of learning" model described by Newcomb and Trefz (1987). The two scales consisted of 23 lower- (remembering and processing) and 33 higher-order thinking skills items (creating and evaluating) (Edwards, 1999). Cronbach's coefficient alpha reliability estimates for the scales were .79 and .78, respectively. The overall student achievement scale (56 items) yielded a measure of internal consistency of .88.

A researcher-developed packet of teacher questionnaires, student questionnaires/examinations, pre-coded scan sheets, and postage-paid return envelopes were mailed to participating teachers. Due to varying end-of-course dates, two general mailings were necessary. Teachers completed their questionnaires and administered the student questionnaires/exams at the same time. Student responses were coded so that they could be identified with their particular teacher and school-day schedule. Descriptive statistics were used to summarize selected teacher and student characteristics. For the research hypotheses, correlational statistics were used to examine relationships between variables. (See Figure 2.)

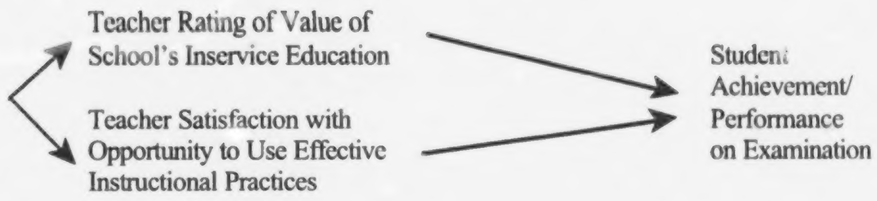
Teacher Rating of Value of School's Inservice Education
Teacher Satisfaction with Opportunity to Use Effective Instructional Practices
Student Achievement/ Performance on Examination

Figure 2. Model for examining relationships among value of inservice education, satisfaction with opportunity to use effective teaching practices, and student achievement.

Results and Findings

Slightly more than three-fourths of the teachers were male; nearly one-fourth were female. Concerning their education, half held only a bachelor's degree while the other half had earned a master's degree. Years of experience as an agriscience teacher showed 50 percent of the teachers having taught 12 or fewer years, and 50 percent indicating 13 or more years of service. When asked about years of service at their current school, nearly 60 percent replied that they had taught at their current school for 10 or fewer years, while slightly more than 40 percent indicated 11 or more years of service. Four-in-ten teachers had taught under two or fewer schedules, while nearly six-in-ten had experience teaching under three or more school-day scheduling patterns (Table 1).

Slightly more than one-half of the participating students were male and 46 percent were female (Table 2). Almost three-fourths of the students were Anglo, while one-fourth identified themselves as "People of Color." Slightly more than one-third had never been an FFA member, and approximately two-thirds had been members for one or more years. Nearly 70% indicated at least "some experience" with domesticated animals, while three-in-ten said they had "little" or no experience. Regarding high school grade classification, slightly more than three-in-ten of the students were twelfth graders, nearly four-in-ten were eleventh graders, one-fourth were in the tenth grade, and about one-in-twenty identified themselves as ninth graders (Table 2).

Table 1
Selected Characteristics of Instructors (N=22) Teaching Animal Science

Characteristic	9-Week Block n	Modified A/B Block n	Overall N	Overall %
Gender				
Male	7	10	17	77.3%
Female	3	2	5	22.7%
Highest Level of Education				
Bachelor's degree	4	7	11	50.0%
Master's degree	6	5	11	50.0%
Years Agriscience Teacher Experience				
1 – 12 years	7	4	11	50.0%
13 or more years	3	8	11	50.0%
Years of Service at Current School				
1 – 10 years	7	6	13	59.1%
11 or more years	3	6	9	40.9%
Number of School-Day Scheduling Patterns Teacher Has Taught Under				
One	1	1	2	9.1%
Two	3	4	7	31.8%
Three or more	6	7	13	59.0%

Table 2
Selected Characteristics of Students (N=324) Enrolled in Animal Science

Characteristic	9-Week Block n	Modified A/B Block n	Overall N	Overall %
Gender				
Male	68	105	173	53.7%
Female	67	82	149	46.3%
Ethnicity				
Anglo (White Non Hispanic)	84	152	236	73.8%
People of Color	51	33	84	26.2%
FFA Membership				
Never	73	42	115	35.9%
Less than one year	24	35	59	18.4%
Two years	19	44	63	19.7%
Three years	15	48	63	19.7%
Four years	4	19	23	7.2%
Experience with Domestic Animals				
None	18	9	27	8.3%
Little experience	37	34	71	21.9%
Some experience	36	43	79	24.4%
Much experience	22	30	52	16.0%
Great experience	23	72	95	29.3%
High School Grade Classification				
12th grade	44	59	103	31.9%
11th grade	56	62	118	36.5%
10th grade	31	53	84	26.0%
9th grade	4	14	18	5.6%

Pearson product moment correlation coefficients were calculated to examine relationships among the value of teachers' inservice education in preparation for their school-day schedule, teachers' satisfaction with opportunity to use effective instructional practices (teaching strategies) under their school-day schedule, and student achievement.

There was a substantial relationship (Davis, 1971) between value of teachers' inservice education in preparation for their school-day schedule and satisfaction with opportunity to use effective instructional practices (teaching strategies) (r = .63). That is, as a teacher's rating of "value" increased for the professional development they had received preparing them to teach on a block schedule, the more "satisfied" they were with their opportunity to implement effective teaching strategies (Table 3).

Table 3
Relationship[1] of Value of Teachers' Inservice Education in Preparation for Their School-Day Schedule and Teachers' Satisfaction with Opportunity to Use Effective Instructional Practices (Teaching Strategies)

	Teachers' Satisfaction with Opportunity to Use Effective Instructional Practices
Value of Inservice Education	.63**

[1] Pearson Product Moment Correlation Coefficient
**$p < .01$.

Also, the relationship between value of teachers' inservice education in preparation for their school-day schedule and end-of-course student performance—lower-order thinking skills, higher-order thinking skills, and overall achievement (Table 4)—was examined. As a teacher's rating of value increased for the inservice education they had received in preparation to teach on a block schedule, the lower-order thinking skills (LOTS) achievement of their students improved ($r = .45$); the correlation indicated a moderate association. There was a substantial relationship between a teacher's rating of value for their inservice education and their students' performance on higher-order thinking skills (HOTS) achievement items ($r = .59$). As a teacher's rating of value increased, their students' HOTS achievement increased. A similar relationship was found between teacher's rating of value for their inservice education and their students' overall achievement ($r = .53$); the correlation indicated a substantial association. As a teacher's rating of value increased, their students' overall achievement improved.

Table 4
Relationship[1] of Value of Teachers' Inservice Education in Preparation for School-Day Schedule and Student Achievement

	Lower-Order Thinking Skills Achievement	Higher-Order Thinking Skills Achievement	Overall Achievement
Value of Inservice Education	.45*	.59**	.53**

[1] Pearson Product Moment Correlation Coefficient
*$p < .05$; **$p < .01$.

As shown in Table 5, there were moderate (Davis, 1971) relationships between teachers' satisfaction with opportunity to use effective instructional practices (teaching strategies) under their school-day schedule and student achievement. That is, as a teacher's satisfaction increased, their student's achievement improved. However, only the relationship between teachers' satisfaction with opportunity to use effective instructional practices (teaching strategies) and higher-order thinking skills (HOTS) was found to be statistically significant.

Table 5
Relationship[1] of Teachers' Satisfaction with Opportunity to Use Effective Instructional Practices Under Their School-Day Schedule and Student Achievement

	Lower-Order Thinking Skills Achievement	Higher-Order Thinking Skills Achievement	Overall Achievement
Teachers' Satisfaction	.33	.38*	.36

[1] Pearson Product Moment Correlation Coefficient
*$p < .05$.

Conclusions, Implications, and Recommendations

Three-in-four teachers were male. Half held only a bachelor's degree while the other half had earned a master's degree. Half of the teachers had taught agriscience for 13 or more years. However, nearly 60 percent had 10 or fewer years of service at their current school. Forty percent had taught under two or fewer schedules, while almost 60 percent had taught under three or more patterns (Table 1). Student gender was nearly evenly divided. Anglos comprised almost 75 percent of the sample. Approximately two-thirds had been FFA members for one or more years. Nearly 70 percent indicated at least "some experience" with domesticated animals, while the remainder reported "little" or no experience. Seven-in-ten were either eleventh or twelfth graders, and the remainder were either ninth or tenth graders (Table 2).

The value of teachers' inservice education in preparation for their school-day schedule (i.e., a block schedule) was positively related to their satisfaction with opportunity to use effective instructional practices (teaching strategies). That is, as a teacher's rating of the value of their inservice preparation increased, so did their satisfaction with their opportunity to use effective teaching practices (Table 3).

The value of teachers' inservice education in preparation for their school-day schedule was positively related to achievement of students in block-scheduled classes. So, as a teacher's value for their inservice preparation increased so did student achievement. This association was statistically significant and positive for lower-order thinking skills, higher-order thinking skills, and overall student achievement (Table 4).

Teachers' satisfaction with opportunity to use effective instructional practices (teaching strategies) was positively related to achievement of students in block-scheduled classes. Therefore, as a teacher's satisfaction with opportunity to use effective instructional practices (under a bock schedule) increased, so did their student's achievement. However, only in the case of higher-order thinking skills achievement was the relationship statistically significant (Table 5).

The findings of this study appear to support the premise that providing teachers with timely and relevant professional development is "essential" for successful school reform

(Birman, et al., 2000; Darling-Hammond & Falk, 1997; Darling-Hammond & McLaughlin, 1995; Hoyle et al., 1994). Further, if the reform targets change in school-day scheduling, for example, the implementation of a block schedule with the concomitant opportunities for instruction that has been linked with gains in student learning (see Figure 1), then inservice education to prepare teachers to perform in this "new" learning context should be provided. Other researchers have supported this conclusion (Durkin, 1997; Kruse & Kruse, 1995; Lasley, 1998; Rettig & Canady, 1996; Shortt & Thayer, 1995; Watson, 1998).

In a study involving biology teachers, Louden (1997) found that the amount of inservice and planning before implementing a block schedule pattern had a positive impact on the attitudes of teachers. Further, those teachers who did not receive inservice training or additional time to plan for the impending change to block scheduling, "seemed the least pleased with their schedule" (p. 105). Interestingly, this study found that agriscience teachers who reported the highest value for the inservice education they received in preparation for their change to a block schedule, reported the greatest satisfaction with their opportunity to implement effective teaching practices, and had students who achieved at a higher level.

Concerning the forces of school climate, its association with teacher satisfaction, and what this relationship may portend for affecting improvements in student learning, Hoyle et al. (1994) stated that "school climate may be one of the most important ingredients of a successful instructional program" (p. 15). Moreover, DeMoulin (Hoyle & Estes, 1993) posited that teachers who had a positive attitude about themselves and their professional roles were more apt to increase the quality of student learning and "were more willing to change procedures in striving for improvements" (p. 155). DeMoulin's contention supports a finding of this study--that the more "satisfied" teachers were regarding their opportunity to implement effective instruction (i.e., striving for improvements) the better their students performed, especially on learning tasks identified as higher-order thinking skills (Table 5).

Recommended for future practice and research are the following: 1) Teachers should be provided professional development that is "contextual" and "coherent" with school reforms (Birman et al., 2000), e.g., changes in school-day scheduling. 2) If it is anticipated that a change will create opportunities for modification of teaching behaviors, e.g., implementation of "new" or modified instructional practices associated with improved student achievement, then inservice education should be provided to assist teachers in acquiring and using these behaviors. 3) School climate factors that facilitate improved teacher satisfaction, especially as it relates to their instructional practice, should be identified, supported, and modeled (Buckman et al., 1995; Hoyle & Estes, 1993; Hoyle et al. 1994). 4) Recognizing the significant role that lower-order thinking skills can play in a student's ascent to higher cognitive behaviors, additional analyses should be conducted attempting to identify moderator variables and relationships that are associated with this level of learning. 5) Other researchers (Canady & Rettig, 1995) have suggested that there is a causal relationship between the use of block scheduling and an improvement in school climate (i.e., classroom environment); further, they discuss the important role that "climate" can play in the behaviors of students and teachers (Hoyle et al., 1994; Kruse & Kruse, 1995). So, additional research should be performed to investigate how other factors comprising a school's "climate" (e.g., conditions affecting student satisfaction) may be positively influenced by a change in school-day schedule. 6) Instructors teaching on different block schedule formats may be using various teaching behaviors that are related to their students' achievement. For this reason, further research, e.g., case studies or other qualitative methodologies, should be conducted describing their instructional behaviors.

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Value of Scheduling-Related Inservice Education, Opportunity to Implement Effective Instructional Practices, and Performance of Block-Scheduled Learners in Agricultural Science: A Correlational Study

A Critique

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This quantitative study of the relationships among teacher in-service education in preparation for block-scheduling, teacher satisfaction with the opportunity to implement effective teaching strategies, and student achievement is a sequel to one presented a year ago by the same researchers. Like their previous study, this research was conducted in Texas; was well designed and implemented, and was as complex as its title. The introduction and theoretical framework for this study was prepared in a comprehensive and cogent manner. The review of literature was extensive and well-balanced in supporting the conceptual framework. Perhaps with the possible exception of using the word "in-service" as a noun instead of an adjective, this was a well written paper.

The purpose of the study and the three enabling research hypotheses were thoughtfully conceptualized and clearly stated. The methods and procedures used to conduct this ex post facto, descriptive-correlational study were appropriate. The target population (n=388) consisted of instructors teaching and students enrolled in Animal Science, an agriscience course offered in Texas public schools during fall 1998. The responding sample involved 22 volunteer teachers and schools representing two different school-day scheduling patterns (21 Modified A/B Block scheduled schools with 136 students and 10 Nine-Week Block scheduled schools with 136 students). The researchers were careful to note that because the data "were provided by a volunteer sample, the results are generalizable only to subsequent similar volunteer samples." Reliability scores were established both for teacher and student questionnaires; instruments were validated.

The conclusions, implications, and recommendations were supported by the findings. Positive relationships were concluded for the following: (a) the value of teachers' in-service education in preparation for their school-day schedule (i.e., block schedule) and their satisfaction with opportunity to use effective instructional practices; (b) the value of teachers' in-service education in preparation for their school-day schedule and achievement of students in block-scheduled classes; and (c) teachers' satisfaction with opportunity to use effective instructional practices and achievement of students in block-scheduled classes. However, only the higher-order thinking skills (HOTS) achievement portion of the previous relationship was statistically significant. What explanation do the researchers have for HOTS being significant, but LOTS (lower order thinking skills) not? Did the researchers find any differences between the three positive relationships when respondents were clustered by kind of block schedule (Modified A/B versus Nine-Week)? A primary implication from this study is that providing teachers with timely and relevant professional development is a necessary condition for successful school reform and that in-service development must be consistent and coordinated with that reform. Commendations are due the researchers for another fine study.

Factors that Encouraged, Discouraged, and Would Encourage Students in Secondary Agricultural Education Programs to Join the FFA

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Abstract

The purpose of this study was to identify factors that encouraged, discouraged, and would encourage secondary agricultural education students to join the FFA. Also, one of the objectives was to describe the students demographically and determine if FFA members differed significantly from non-FFA members on selected demographic variables. A mail questionnaire was sent to a purposive sample of agricultural education departments in two states in each of the four FFA regions. All of the schools responded. The questionnaire was completed by 634 students with 53% of the sample from metropolitan schools and 47% from non-metropolitan schools. Exploratory factor analysis was used to identify factors and a bootstrapping procedure was used to determine if FFA members and non-FFA members differed significantly on the demographic variables. There were significantly more Asian, African American, and Hispanic students who were non-FFA members. There were significantly more freshmen who were non-FFA members and seniors who were FFA members. A significant number of non-FFA members responded that agriculture in the community was not important, slightly important, or didn't know. A significant number of FFA members indicated they had a high level of interest in agriculture while a significant number of non-FFA members indicated no or minimal interest in agriculture. Analysis of the demographic data revealed that the freshmen year is critical for recruiting students to join the FFA. For students that joined the FFA a three factor model explained approximately 57% of the variance with the personal development factor explaining the largest portion of the total variance. For students who did not join the FFA a four factor model explained approximately 60% of the variance with the negative image of the FFA factor explaining the largest portion of the total variance. For students who would consider joining the FFA a five factor model explained approximately 65% of the variance with two factors- knowledge of the FFA and image of the FFA - each explaining approximately 17% of the total variance. To encourage students to join the FFA the National FFA Organization needs to expand the FFA knowledge base at the secondary level, change the stereotypic image of the FFA, and attract a more diverse student population by showing how the FFA can positively affect a student's career choice even if that choice is minimally related to agriculture.

Introduction

One of the core goals of the FFA is to expand their customer base by expanding FFA membership that is representative of the student body (FFA website). In August 1996, the National FFA Organization set a recruitment goal to grow the national membership by 66 percent to 750, 000 members nationwide by 2002 (National FFA Organization, 1996, p. 1). In 1995 the National FFA Organization estimated there were approximately 600,000 secondary agricultural education students of which 430,000 joined the FFA and the remaining 170,000 were not members of the FFA. From the 1993 State Annual Reports supplied to the National FFA Organization, membership as a percent of enrollment in agricultural education in the four regions was as follows: Central 81%, Eastern 69%, Western 75%, and Southern 63%. In order to achieve its recruitment goal the National FFA Organization needs to be aware of what factors influence a student to join the FFA, what factors discouraged a student from joining the FFA, and what factors would encourage a student to join the FFA.

Theoretical Framework

FFA as a Youth Organization

The National FFA Organization's mission is "dedicated to making a positive difference in the lives of young people by developing their potential for premier leadership, personal growth, and career success through agricultural education" (National FFA website). Generally, the FFA provides leadership opportunities for students enrolled in an agricultural education program and is dedicated to the leadership development of its members. Youth organizations like the FFA have been "extremely popular with both secondary and post secondary vocational education over the years" (Lankard, 1996). Many youth organizations such as Boys and Girls Clubs and Girls Incorporated provide youth development experiences which are aimed at providing a healthy transition from adolescence to adulthood (Gambone & Arbreton, 1997). The researchers drew upon theories and research in adolescent development to define the following seven developmental measures: safety, challenging and interesting activities, a sense of belonging, supportive relationships with adults, leadership, input and decision-making, and community service. The researchers discovered that youth who experienced some or all of the seven measures are more likely to have a productive adolescence and will ultimately mature into responsible adults. Lynch, et al. (1994) identified the following components of a high quality vocational education: innovative and flexible teachers, meaningful partnerships with business and industry, supportive administrators, technologically current equipment and supplies, and strong vocational student organizations.

The FFA espouses the notion that it can be of service in helping a student prepare for a career whether it is in agriculture or not. Bakar and McCracken (1994) reported a relationship between a student's career maturity, which was defined as 'the individuals readiness to make educational and career decisions that are expected of them" (p. 1), and participation in the FFA. In this study FFA membership benefitted the student's career development. Many studies have found a relationship between participation in youth organization leadership activities and leadership life skills development (Dormoody & Seevers, 1994; Wingenback & Kahler, 1997). However, are leadership opportunities the main reason why students join the FFA? Hall (1993) asked adult postsecondary members why they joined the Vocational Industrial Clubs of America (VICA) and almost all responded they thought being a club member would help them develop competencies necessary for employment.

While the FFA is concerned about growing its membership, two VICA clubs - Technology Student Association and Health Occupations Students of America, have increased their membership mainly because they have included current career opportunities such as, technical preparation and applied academics into their organization (Hannah, 1993).

Reasons for Joining the FFA

There are many reasons why students decide to join youth organizations. Turner and Herren (1997) discovered that FFA members had a higher need for achievement, affiliation, and power than non-FFA members. Marshall, Herring, and Briers (1990) reported that students joined the FFA mainly because it enhanced their personal identity and to a lesser degree to become involved in activities. Connors, Moore, and Elliot (1990) found a student's interest in learning about agriculture even if they did not want to join the FFA as the most influential factor. For minority students researchers found that students joined youth organizations because of the positive experiences, educational activities, and opportunities for personal development (Cano & Bankston, 1992) as well as for personal and social benefits (Morris & Co., 1992).

Barriers to Joining the FFA

Not all agricultural education students join the FFA. Hoover and Scanlon (1991) found that overall the image of agricultural education, the FFA, and the agriculture profession in general was the main reason why students did not enroll in agricultural education and join the FFA. Pursuing the student's reasoning further the researchers reported that students perceived agricultural education and the FFA as being for rural males, saw no future value in taking agricultural education courses, and were persuaded by significant others not to enroll in agricultural education and not to join the FFA. Connors, Moore, and Elliot (1990) reported that students did not join the FFA because of a low level of interest in agriculture and they perceived little future value of the FFA to their career. Cano and Bankston (1992) conducted focus groups with minority youth in 4-H and found a lack of finances and minority role models were barriers to their involvement in 4-H.

Purpose

The purpose of this study was to identify factors that encouraged, discouraged, and would encourage secondary agricultural education students to join the FFA.

Objectives

1. To describe the students demographically
2. To identify factors that encouraged students to become members of the FFA
3. To identify factors that discouraged students from becoming members of the FFA
4. To identify factors that would encourage students to become members of the FFA

Methodology

Subject Selection

Questionnaires were sent to a purposive sample of agricultural education programs throughout the United States in October 1995. The National FFA Organization identified those states with the highest percentage of non-members based upon FFA membership as a percent of agricultural education enrollment as reported to the National FFA through the 1993 State Annual Report. The states were divided into the four FFA regions (Central, Western, Eastern, and Southern), and the two states having the lowest percentage of FFA membership in each of four regions were selected. Those states were the following: Georgia (51.4%), Florida (55.2%), Virginia (39.8%), Wisconsin (69.3%), Washington (37.9%), Idaho (52.6%), Delaware (37.9%), and Michigan (67.7%). The state FFA executive secretary from each state was asked to nominate one rural (non-metropolitan, ≤ 20,000 county population) and one urban (metropolitan, >20,000 county population) school with a high percentage of non-members based on agricultural education enrollment data.

Teachers in each of the 16 selected schools agreed to participate in the study. Each teacher was sent questionnaires and administered them to their students who were in attendance on that day. The data were collected during October and November 1995.

Description of the Sample

The questionnaire was completed by 634 students. Fifty-three percent of the sample were from metropolitan schools, while 47% were from non-metropolitan schools. The following are the states that participated in the study with the number of students that responded to the questionnaire and the percentage related to the total sample: Delaware 145 (23%), Florida 83 (13%), Georgia 49 (8%), Idaho 103 (16%), Michigan 34 (6%), Virginia 76 (12%), Washington 72 (11%), and Wisconsin 72 (11%).

Instrument Development

The questionnaire was based upon factors identified in the review of literature and from interviews conducted with a previous national FFA officer, former agricultural education instructors, and teacher educators. A panel of nine experts reviewed the questionnaire for face and content validity. The panel consisted of teacher educators, an FFA executive secretary, a national FFA officer, high school agriculture instructors, and a 4-H administrator. The questionnaire was field tested and pilot tested in September and October 1995. Students' attitudes were assessed by three sets of items using a four-point Likert-type scale from strongly disagree to strongly agree. Test-retest procedures were utilized during the pilot test to calculate reliability over a two week period and a 61% agreement on a set of 32 items which influenced students not to join the FFA was obtained. A 68% agreement was achieved on a set of 20 items which would influence students to join the FFA. A 71% agreement was achieved on a set of 18 items why students joined the FFA. Ex post facto internal consistency reliability was computed using Cronbach's alpha which was .95, .92, and .88 respectively on the three sets of items.

Data Analysis

Frequencies were computed for selected demographic nominal variables for FFA members and non FFA members using SPSS version 10.0.5. Resampling Stats, version 5.0.2, which is a computer program utilizing bootstrapping procedures was used to determine if differences existed between FFA members and non FFA members on these demographic variables. Bootstrapping procedures were used due to the fact that random sampling was not used in selecting the sample and thus the assumptions for conventional statistics could not be met. Bootstrapping allows one to use the data available and through simulation to determine exact probabilities without having to meet the assumptions needed with conventional statistical procedures.

Exploratory factor analysis using principal component extraction procedures in SPSS was used to identify the following factors: (a) factors that encouraged FFA membership, (b) factors that discouraged FFA membership, and (c) factors that would encourage FFA membership. Factor analysis provided a parsimonious number of factors which could be used to represent relationships among sets of many interrelated variables. Based upon the correlation matrix, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin measuring of sampling adequacy, the data were considered appropriate for factor analysis.

Two criteria were used to determine the number of factors to be extracted. First, only factors with eigenvalues grater than 1.0 were considered in the analysis. Second, a scree plot of the factor eigenvalues was used to identify breaks or discontinuity in determining the number of factors. The factors were rotated using a varimax rotation method with Kaiser Normalization to aid in the interpretation of the factors. The factors resulting from such a rotation are orthogonal to each other. Based upon an alpha level of .01, Stevens (1992) suggests using loadings of .40 absolute when determining which items are significant in loading on a factor since there is considerable opportunity for capitalization on chance.

Results

Selected demographic data for FFA members and non-FFA members in the sample are reported in Table 1. Using the bootstrap procedure, significant differences were found between FFA members and non-FFA members at the .05 alpha level in the following characteristics: ethnic background, class rank, year first enrolled in agricultural education, importance of agriculture in the community, and level of interest in agriculture.

There were significantly more Asians, African Americans, and Hispanics who were non-FFA members than were FFA members. There were significantly more freshmen who were non-FFA members than were FFA members. There were significantly more seniors who were FFA members than were non-FFA members. For the year the student was first enrolled in agricultural education there were significantly more sophomores, juniors, and seniors who were non-FFA members than there were

FFA members. When the first year of enrollment in agricultural education was during their freshmen year, there was an even split between FFA members and non-FFA members. On the importance of agriculture in the community significant differences were found between FFA members and non-FFA members. There were significantly more non-FFA members who responded that agriculture in the community was not important, slightly important, and did not know than those students who were FFA members. On the level of interest in agriculture significant differences were found between FFA members and non-FFA members. More non-FFA members responded that they had no interest or minimal interest in agriculture while significantly more FFA members responded they had a high interest in agriculture.

Table 2 reports the factor loadings for those students who did not join the FFA. A four factor model explained approximately 60% of the variance. The researchers named all of the factors in this study. The first factor was labeled "negative image of the FFA" and included items such as "the FFA is for low ability students; the guidance counselor encouraged me not to join." The second factor was labeled "values conflict" where the student's values were not in line with what they perceived the values of the FFA were. This factor included items such as "my contributions would not be valued." The third factor was labeled "time conflict" and most of the items were in reference to students' after school jobs and activities. The fourth factor was labeled "lack of peer involvement."

Table 3 reports the factor loadings for those students who joined the FFA. A three factor model explained approximately 57% of the variance. The first factor was labeled personal development and included items such as "the FFA helps me prepare for the future; the FFA helps me improve my leadership activities." The second factor was labeled "positive image of the FFA" and included items such as "the FFA chapter has a good image; the FFA is fun." The third factor was labeled "former family FFA members."

Table 4 reports factor loadings for students who were not FFA members but would consider joining the FFA if certain incentives were in place. For this group a five factor model explained approximately 65% of the variance. The first factor was labeled "knowledge of the FFA" and included items such as "I would join the FFA if the experience got me a good job; I would join the FFA if FFA activities were during class time." The second factor was labeled "image of the FFA" and included items such as "I would join the FFA if less emphasis was placed on farming; if the FFA was more important than my current activities." The third factor was labeled "teacher encouragement." The fourth factor was labeled "lack of time" which included items such as "more FFA activities during class time; conflicts with work after school." The fifth factor was labeled "interest in agriculture as a career."

Table 1. Student Demographic Summary

Characteristics	FFA Member		Non FFA Member	
	Number	Percent	Number	Percent
Gender				
Male	175	47	198	53
Female	111	47	125	53
Ethnic Background				
Asian*	0	0	12	100
African American*	17	35	32	65
Hispanic*	6	25	18	75
Native American	8	50	8	50
White (Caucasian)	246	50	245	50
Other	7	54	6	46
Class Rank				
9th Grade*	59	35	110	65
10th Grade	71	49	74	51
11th Grade	71	44	92	56
12th Grade*	71	59	49	41
Part-time Work				
No	78	43	105	57
Yes	207	49	218	51
Year first enrolled in Agricultural Education				
9th Grade	169	50	166	50
10th Grade*	41	40	62	60
11th Grade*	38	37	64	63
12th Grade*	13	35	24	65
Importance of agriculture in the community				
Not Important*	12	32	25	68
Slightly Important*	20	41	29	59
Moderately Important	97	55	79	45
Very Important	132	54	113	46
Don't Know*	23	24	75	76
Level of interest in agriculture				
No Interest*	19	20	77	80
Minimal Interest*	42	30	100	70
Moderate Interest	111	52	102	48
High Interest*	112	73	42	27

*$p \leq .05$

Table 2. Rotated Factor Matrix of Factors which Discouraged FFA Membership using Varimax Rotation with Kaiser Normalization (n=154)

Items which Discouraged FFA Membership	Factors			
I have not joined the FFA because ...	1	2	3	4
the guidance counselor encouraged me not to join	.81			
FFA is only for lower ability students	.80			
I did not feel welcomed by the advisor	.80			
FFA is only for higher ability students	.77			
I have a negative image of agriculture	.73			
FFA is not for minority students	.72			
the instructor is not supportive of the FFA	.72			
FFA is for rural students only	.69			
my parents are not supportive of the FFA	.65			
I did not feel welcomed by FFA members	.64			
I have a negative image of FFA	.64			
the local FFA chapter is not very good	.63		.53	
I have never been asked to join FFA	.61			
the dues are too high	.56			
there are not enough opportunities for me in FFA	.55	.55		
I have a personality conflict with the FFA advisor	.53			
FFA meeting are held at a bad time	.47		.47	.41
FFA does not improve my popularity	.45			
there are too many requirements for FFA participation	.44			.40
there is no future value in FFA for me		.83		
there is no present value in FFA for me		.77		
I am not interested in agriculture as a career		.72		
there are no role models for me in FFA		.71		
I have more important things to do with my time		.65		
my contribution would not be valued	.40	.56		
I have a conflict with other school activities			.76	
FFA activities are not held during school hours			.70	
I need to work after school			.46	
few, if any, friends are in FFA				.76
I have no time for FFA events		.42		.59
I have no transportation to FFA events				.54
I don't know about FFA	.47			.51
Eigenvalue	9.1	4.7	2.9	2.7
Percent Total Variance	28.3	14.6	9.1	8.4

Table 3. Rotated Factor Matrix of Factors which Encouraged FFA Membership using Varimax Rotation with Kaiser Normalization (n=154)

Items which Encouraged FFA Membership	Factors		
I have joined the FFA because ...	1	2	3
FFA enhances my personal development	.84		
FFA helps me prepare for the future	.83		
FFA will improve my leadership abilities	.83		
there are role models for me in the FFA	.74		
I have opportunities for awards	.72		
I enjoy FFA competition	.71		
I am interested in agriculture as a career	.60		
my agriculture instructor motivated me to join	.50		
our chapter has many members		.82	
the FFA chapter has a good image		.70	
FFA is fun	.54	.60	
I have few transportation limits to FFA events		.59	
I like to take part in school activities	.41	.54	
many of my friends are in FFA		.52	
I can pay FFA-related costs	.46	.48	
my parents were involved in FFA			.77
my brothers and sisters were FFA members			.75
I had no choice, FFA is part of agricultural education			.68
Eigenvalue	5.2	3.1	2.0
Percent Total Variance	28.7	17.33	10.8

Table 4. Rotated Factor Matrix of Factors which would Encourage FFA Membership using Varimax Rotation with Kaiser Normalization (n=264)

Items which Would Encourage FFA Membership	Factors				
I would join the FFA if ...	1	2	3	4	5
my ideas were welcomed and valued by the group	.80				
I had more knowledge about the FFA	.75				
more leadership opportunities were offered	.66	.45			
FFA experience got me a good job	.58				
more FFA activities were during class time	.45			.44	
I had a different FFA advisor	.44				
there were less emphasis on farming		.84			
there were more role models in FFA		.70			
FFA was more important than my current activities		.65			
FFA dues were lower		.62			
the chapter paid my FFA dues	.54	.56			
my parents encouraged me to join		.43	.43		
my band/music/drama teacher encouraged me to join			.88		
my athletic coach encouraged me to join			.82		
FFA had a better image			.52		.43
I had more time				.80	
I didn't have to work after school				.76	
I had more friends in the FFA				.55	.54
I were interested in agriculture as a career					.79
more interesting FFA activities were conducted		.41			.42
Eigenvalue	3.4	3.3	2.6	2.1	1.7
Percent Total Variance	16.7	16.7	12.9	10.6	8.5

Conclusions and Recommendations

The demographic data for the students in this study revealed that the freshmen year is critical for recruitment purposes for the FFA since the largest number of students enroll in agricultural education as a freshmen. The data collection for this study occurred in October and November which is the beginning of the school year so it could be that the benefits of FFA membership had not yet been promoted to the students which may be why the majority of freshmen on the class rank variable (65%) were non-FFA members. For students whose first year of enrollment in agricultural education is not as a freshman these students tend not to join the FFA. These students may be in a specialized program such as, horticulture or agricultural mechanics and they have less interest in taking advantage of the FFA's activities such as, leadership development. A significant number of non-FFA members rated the importance of agriculture in the community as not important or slightly important. Possibly, these students did not realize how agriculture directly or indirectly affects their lives and their community. It is interesting to note that a significant number of non-FFA members responded they did not know the importance of agriculture in their community. The reader needs to be reminded that the students in this study were in agricultural education programs so one would assume they would have some knowledge about the importance of agriculture in the community. This finding may signify a lack of knowledge about the indirect impact of agriculture. Non-FFA members had no interest or minimal interest in agriculture while FFA members had a high interest in agriculture. It is not surprising to note that since non-FFA members did not even know about the importance of agriculture in the community that their level of interest in agriculture is minimal at best. Perhaps some basic information and education about agriculture in general as well as related fields such as processing, marketing, business, economics, and education may increase their level of interest in agriculture. Too much emphasis on production agriculture is not doing justice to the numerous opportunities agriculture offers to all students.

For students that joined the FFA they perceived personal development opportunities as the most motivating factor followed by a positive image of the FFA and by family members who were former members of the FFA. These findings for students who joined the FFA supports the research by Turner and Herren (1997), Marshall, Herring, and Briers (1990), and Connors, Moore, and Elliot (1990). The image the FFA is trying to convey is reaching these students but these students probably enjoy competition, are interested in agriculture as a career, and were encouraged by family members to join the FFA. For students who did not join the FFA the negative image of the FFA was the most powerful factor and contained items such as " guidance counselor encouraged me not to join the FFA; the FFA is for low ability students." Interestingly, this group of students perceived that the FFA was not for minority students, did not feel welcome by FFA members, and did not see any future value in the FFA. These findings support the research by Hoover and Scanlon (1991) and Connors, Moore and Elliot (1990). For students who were not FFA members but would consider joining the FFA they lacked knowledge about the FFA, felt there should be less emphasis placed on farming, and wanted to relate FFA experiences with getting a good job. These findings support the research by Hannah (1993) which emphasized that youth organizations must change as the needs of its students change.

To encourage students to join the FFA agricultural education teachers should educate the school's guidance counselors, other teachers, and students in general about the positive aspects of the FFA and begin to change their mind set that the FFA is for low ability, rural students. The negative image the FFA has among some students in this study suggests that the image problem needs to be addressed not only at the local level but statewide and nationally. The negative image that some students had that the FFA is not for minority students and there are few role models in FFA for them indicates that the FFA should try to recruit minority students by showing and encouraging more diversity in its membership and allowing those students to tell others what the FFA has done for them developmentally and what skills they have acquired which can apply towards a future occupation. The days when the FFA stood primarily for white, rural, male youths focused upon farming as a career needs to change to attract a new, diverse student population who may consider agriculture as a career if the stereotypic images are replaced with FFA experiences which can help a student attain job opportunities in business, agriscience, technology, and other related fields. To attract this new group of students the National FFA Organization as well as agricultural education teachers need to be aware that this group of students may not have need for achievement, affiliation, and power that traditional FFA members have so different recruitment strategies are necessary such as focusing upon how the FFA can help them secure a good job. This group needs basic knowledge not only about the FFA but about the many job opportunities available in agriculture. This study also found that students don't have as much free time after school so FFA activities should be a part of class time to encourage students to participate which may lead them to join the organization. In order for the National FFA Organization to reach one of its core goals of "expanding our customer base by expanding FFA membership that is representative of the student population" they need to work on expanding the knowledge base about the FFA at the secondary level, work on changing the image of the FFA at the local, national, and state levels, and actively recruit a more diverse student population by updating how the FFA can positively affect a student's career choice even if that career is minimally related to agriculture such as communications, education, or technology.

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Factors that Encourage, Discouraged, and Would Encourage Students in Secondary Agricultural Education Programs to Join the FAA

A Critique

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The authors have selected and developed a timely research study of importance to agricultural educators and vocational and technical educators, nationwide. For those agricultural educators who have experienced success as FFA members, FFA chapter advisors, or in other capacities associated with the FFA, it seems enigmatic that many of today's secondary agricultural education students complete their schooling without becoming FFA members. The researchers are to be commended for investigating why this problem of missed educational opportunity for thousands of high school youths persists across the nation. Factor analysis was used very effectively in this study to gain considerable insight into understanding this problem.

This paper provides a comprehensive, yet concise, theoretical framework for the study reported. Both purpose and objectives are equally concise, but sharply focused. Although the population was not specifically stated, one could presume that it included all secondary students enrolled in agricultural education during fall semester of 1995. The researchers followed a rather ingenious purposive sampling plan in selecting their survey participants. They selected two schools (one rural, one urban) in each of two states with the lowest percentage of FFA membership in each of the four national FFA regions--for a total of 16 high schools with agricultural education programs. The survey instrument was adequately developed, validated, and field tested. After the data collection, a rather complex, but appropriate, factor analysis process was used to determine exact probabilities of the variables involved. The tabular findings were clearly presented; however, the paper, itself, would benefit from some careful editing.

The conclusions and recommendations seemed fully supported by the findings and should be a fine context for questions and discussion. If the freshman year is critical for FFA recruitment purposes, how can school systems with block schedules, area occupational school programs (where students attend half or alternate day classes, etc.), and other non-traditional arrangements for agricultural education encourage students to join FFA? How can students enrolled in specialized agricultural education programs, such as horticulture or agricultural mechanics, be motivated to become FFA members? What can agricultural educators do to provide a curriculum that teaches early on the importance of agriculture in local communities and to the everyday lives of students? Also, that teaches the importance of FFA for developing personal leadership qualities and gaining employment? How can the FFA show and encourage more diversity in its membership so minority students feel more welcome to join? How can FFA activities be scheduled to accommodate students who have after school-day commitments (jobs, family responsibilities, etc.)? This is an excellent study--one which has high utility for agricultural educators.

Assessing Research Capacity in Agricultural Education: A Case Study of NCA-24 Institutions

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Abstract

This study was conducted to assess the research capacity of Agricultural Education. Research capacity was defined as the collective capability of university faculty to conduct independent research or to contribute to interdisciplinary research. Agricultural Education research has a relatively short history which has been criticized as being too internally focused. Increased emphasis on interdisciplinary research has prompted the need to identify research and disciplinary strengths in order to determine the potential for Agricultural Education to contribute to interdisciplinary initiatives. The primary purpose of the study was to identify factors that characterize research and researchers in Agricultural Education.

Agricultural Education faculty from twelve Land Grant institutions represented on the NCA-24 Committee on Research in Agricultural Education provided data for this study. Respondents were asked to report information regarding their individual faculty appointment and their level of expertise in several research skill and disciplinary skill areas. Respondent numbers ranged from one faculty member at each of two institutions, to 21 faculty members at one institution.

The findings reported in this study revealed that Agricultural Education faculty averaged less than 15 percent of their faculty appointment devoted to research; while over 50 percent was devoted to teaching responsibilities. The respondents also reported wide variations in grant funding, graduate degrees awarded, and research publications. In addition, individual responses ranged from 'none' to 'expert' for each of the 12 research skill areas and the 27 disciplinary skill areas. Means for each of the items clustered around the midpoint of the five point response scale. Therefore, this study was unable to discern a core set of research skills or disciplinary skills that characterized Agricultural Education faculty research capacity.

Since the faculty respondents comprised a case study of NCA-24 institutions, the results of this study cannot be generalized beyond the participants. However, this study may have implications beyond those who provided data for this study. Recognizing the limits of generalizing results, the following recommendations were proffered. First and foremost, a comprehensive assessment of research capacity should be conducted to allow generalization to the Agricultural Education profession. Furthermore, increased emphasis should be placed on research activities through faculty appointments and graduate student preparation. Finally, Agricultural Education faculty should individually and collectively strive to develop and promote core research and disciplinary skills in order to identify opportunities to make unique contributions to interdisciplinary research initiatives.

Introduction

Land grant universities in the United States have a storied history beginning with the Morrill Act of 1862. This act ceded land to individual states for the purpose of developing postsecondary educational institutions that focused on teaching agriculture and mechanical arts. These new institutions were created to extend educational opportunities for the 'common man' who had not been well-served by the elite Ivy League colleges and universities during the early decades of the 1800s.

Twenty-five years after the Morrill Act, the Hatch Act (1887) was passed by Congress which established Agricultural Experiment Stations in conjunction with land grant universities. Agricultural Experiment Stations were created as a means of facilitating and validating land grant university faculty interests in research. Although teaching had historically been viewed as the singular focus for faculty employed in land grant universities, many early land grant university faculty began to "experiment" with new ideas in their disciplines as the emphasis on increasing agricultural knowledge in order to increase food and fiber production began to swell.

Finally, in 1914, the Smith-Lever Act provided funding to encourage states to develop cooperative extension programs in order to 'extend' the resources of the land grant university beyond the college campus and assist farmers and homemakers in solving their common problems. Extension programs were envisioned as a major initiative to improve the quality of life for disadvantaged citizens by extending the resources and benefits of the land grant university to rural areas.

Each of these acts provided the impetus for the present day, tripartite mission of a land grant university including teaching, research, and extension. These three functions provide a strong system of interrelationships which serve to enhance the efficiency and effectiveness of the land grant system in the U.S.

In 1917, the Smith-Hughes Act provided funding to support the development of Agricultural Education programs in secondary schools. The Smith-Hughes Act specified that funds appropriated in support of the act could be devoted to teacher salaries, supervision, and teacher preparation programs. Thereafter, university level Agricultural Education faculty were employed by land grant colleges and universities to prepare students for careers as secondary agricultural educators.

Over the years, Agricultural Education faculty in land grant universities have devoted their primary effort toward the teaching function. However, in recent years, increasing numbers of faculty have begun to turn their attention toward research. The transition from a discipline devoted primarily to teaching, into a discipline with a significant research emphasis is the primary focus of this paper.

Research in Agricultural Education has a relatively short history. Although Agricultural Education faculty have been employed by land grant universities since the early 1900s, it wasn't until 1974 that the first National Agricultural Education Research Conference was held. Faculty attending this meeting witnessed presentations of research papers on topics primarily related to problems facing secondary agricultural educators. Since that first national research conference, the number and scope of the research papers has increased; however, the primary focus continues to rest with problems facing agricultural educators.

Land grant research administrators (i.e. Experiment Station Directors) have been critical of what may be described as 'naval gazing' research conducted by Agricultural Educators. Research administrators (Jordan, 1993) have suggested that Agricultural Education research should extend beyond its disciplinary confines to identify larger and more significant research problems to address. Agricultural Education research has the potential to contribute to improved teaching and learning in the agricultural and food sciences. Furthermore, numerous authors have suggested that major societal problems require solutions that can only be resolved through interdisciplinary efforts. An ad hoc committee of the National Research Council's Board on Agriculture (April, 2000, p. 5) promoted the need for ". . . multidisciplinary research because the problems in the food, fiber, and natural-resources system demand multidisciplinary approaches and collaboration."

These views suggest that the unique strengths and capabilities of several disciplines are needed to achieve solutions to the complex issues of importance in today's society. Each discipline must therefore identify its unique contributions and potential to 'add value' to interdisciplinary research. Therefore, for the purpose of this study, research capacity was defined as the collective capability of Agricultural Education faculty to conduct independent research or to contribute to interdisciplinary research. Research capacity not only relates to the potential for performing research within the discipline, but also the potential to contribute to developing solutions to larger research problems that lie beyond disciplinary boundaries.

Faculty in Agricultural Education are in a position to contribute to interdisciplinary research in an attempt to develop solutions to major societal problems affecting agriculture and rural areas. However, Agricultural Education as a profession needs to be able to effectively assess and communicate the role and scope of its potential contributions. Agricultural researchers, experiment station directors, and funding agency administrators should be made aware of the potential contributions which agricultural educators can offer to interdisciplinary research. In order to communicate the skills and abilities of Agricultural Education researchers, it is necessary to assess their individual, institutional, and disciplinary strengths.

> "While most public issues and concerns involve people, the scientists who understand people have not been very effective in marketing the value of their skills to those who appropriate public research dollars, to colleagues in other scientific disciplines, and to numerous interest groups. The literature and individual experiences provide many examples. The challenge for social scientists is to enhance the perceived value of their skills and abilities." (Holder, 1998, p. 1).

Agricultural Educators must assume a more progressive and proactive role in promoting their capacity to function effectively as members of interdisciplinary research teams in the agricultural, food, and environmental sciences. Although there is a continuing need for focused research on technical and disciplinary problems, most of the complex social problems facing U.S. citizens will require input from multiple sources to generate appropriate solutions.

MacKenzie (1997) outlined several reasons supporting the need for assessing research capacity. He acknowledged that during periods of enormous change, there was a need for "... greater institutional accountability for public funding, dramatic changes in institutional responsibilities, and an on-going individual institutional efforts to document the social, economic, and environmental benefits of programs" (MacKenzie, 1997, p. 1).

Developing an understanding of research capacity is an important prerequisite to promoting interdisciplinary research involving agricultural educators. Research capacity is a broad concept that has dimensions that extend from individual faculty, to Agricultural Education programs within institutions of higher education, and ultimately to the discipline level which encompasses the entire profession (MacKenzie, 1997). Before agricultural educators are in a position to promote their potential contributions to interdisciplinary research, they must first assess what it is they have to offer. Research capacity collectively includes faculty FTEs, faculty appointments, skills, graduate student numbers, and the availability of research support services. Each of these factors are important links in the research chain which is only as strong as its weakest link.

Purposes and Objectives

The purpose of this study was to collect, summarize, and review information regarding Agricultural Education research capacity. The intent was not to conduct a comprehensive review of the research skills of Agricultural Education faculty; rather the intent was to develop baseline data to serve as a 'point of departure' for subsequent efforts to enhance and promote the involvement of Agricultural Education faculty in research.

Specifically, this project was guided by the following objectives:

1. To review indicators of research productivity in Agricultural Education.
2. To assess the human resources available in Agricultural Education to conduct research.
3. To identify research and disciplinary strengths of Agricultural Education faculty.

Methods / Procedures

The data for this project were collected in a two-stage process. Initially, members attending the NCA-24 committee on Agricultural Education Research in February, 2000 were asked to review the data collection instrument. After extensive discussion, the NCA-24 committee members agreed to complete the instrument, based on their individual perspectives and local programs. After completing the instruments, the NCA-24 committee members recommended that instruments be distributed to their respective faculty in order to collect baseline information for each department and to summarize the data for a more comprehensive analysis and review. NCA-24 members were sent an email file attachment of the data collection instrument and asked to have each of their faculty members provide the information requested. Thereafter, each NCA-24 committee member collected the completed instruments from faculty at their respective institution and forwarded them to the authors.

The NCA-24 committee was comprised of Agricultural Education faculty (primarily department administrators) from each of the land grant institutions in the North Central Region. The twelve states in the North Central Region included: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. In addition, representatives from Arkansas, Oklahoma, and Texas were also invited to participate as members of the committee.

The data collection instrument was comprised of two pages. One page requested information on the respondent's faculty appointment regarding: rank, length of appointment, workload assignment, and tenure status. Respondents were also asked to indicate their level of expertise (scale values of 1 = none to 5 = expert) in several research skill areas related to planning, managing, conducting, and reporting research. In addition, respondents were asked to identify the numbers of: graduate students advised, research manuscripts authored, grants funded, and grant funding received during the five-year period from 1995-1999.

The second page of the data collection instrument asked respondents to indicate their level of expertise (scale values of 1 = none to 5 = expert) on Agricultural Education disciplinary skills organized into four categories labeled: Needs Assessment, Curriculum Development & Instructional Design, Information Transfer & Delivery, and Evaluation & Assessment.

The data were entered onto a personal computer and analyzed using SPSS 10.0. The data were summarized using descriptive statistics since the purpose of this project was to describe the overall characteristics of the Agricultural Education faculty and programs.

Results/Findings

Data collection instruments were received from 73 agricultural educators from land grant Agricultural Education programs in eleven states. The number of responses received per state ranged from one response each from North Dakota and Kansas to 21 responses from Texas. Faculty respondents included: 5 Instructors (6.8%), 14 Assistant Professors (19.2%), 20 Associate Professors (27.4%), and 24 Professors (32.9%). Most Agricultural Education faculty reported they were employed on a 12 month basis (n = 50, 68.5%); although 13 respondents (17.8%) indicated they were employed on a 9 month basis, and 9 respondents reported their faculty appointment was something other than a 9 or 12 month appointment.

Regarding grants and grant funding, Agricultural Education faculty reported receiving (for the 1995-1999 period) an average of just over five grants totaling $377,780. However there was wide variability in the number and amount of grants received by faculty. Nine faculty indicated that they had not received any grants during the five year period and one respondent had received 31 grants during that time. The amount of funding also varied widely from zero to $4.6 million during the five year period.

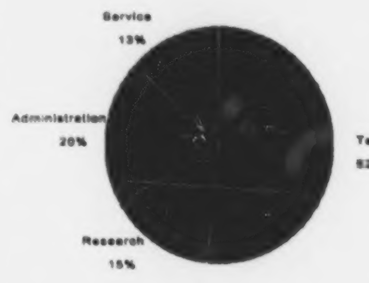

Figure 1. Faculty Appointments

Figure 1 presents a composite pie chart of Agricultural Education faculty respondent appointments in Teaching, Research, Service, and Administration. On average, Agricultural Education faculty devoted slightly over half (52%) of their time and effort to Teaching responsibilities. In addition, they averaged 20% to Administration, 15% to Research, and 13% to Service activities. This allocation of faculty time

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and effort revealed that Agricultural Education faculty were primarily oriented toward teaching, with lesser but nearly equal time devoted to administrative, research, and service activities.

Figure 2 illustrates the number and proportion of graduate degree recipients advised by Agricultural Education faculty respondents during the 1995-1999 period. Three-fourths of the graduate degrees awarded were at the master's level (n = 522) and one fourth (n = 172) were at the doctoral level. These data depict a 3:1 ratio of masters:doctoral degrees awarded during the five year period, with an average of approximately 8.08 masters and 2.69 doctoral graduates per faculty respondent.

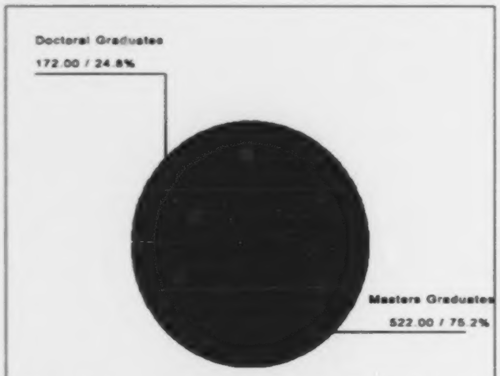

Figure 2. Graduate Degrees Awarded (1995-1999)

Figure 3 presents information from Agricultural Education faculty respondents regarding authorship of research manuscripts during the 1995-1999 period. Approximately two-thirds of the manuscripts authored by the respondents were research papers and one third were journal articles. On average, each faculty member authored over three journal articles (range from 0 to 28, M = 3.46) and six research papers (range from 0 to 41, M = 6.19) during the five year period.

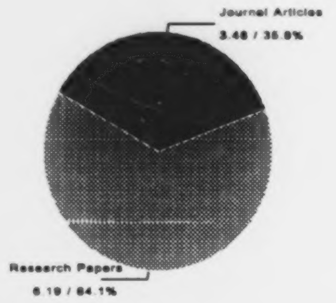

Figure 3. Research Manuscripts (1995-1999)

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Figure 4 presents Agricultural Education faculty responses regarding their self-reported level of expertise in several research skill areas related to planning, managing, conducting, and reporting research. Mean scores for all respondents are illustrated on the bar chart depicted in Figure 4. The highest rated skill area was Project Management which produced a mean rating of 3.37 on the 5.0 point scale. The lowest rated item was Qualitative Research which produced a mean rating of 2.56. Each of the twelve items produced mean ratings that clustered around the 3.0 level indicating 'some experience' with each of the research skills.

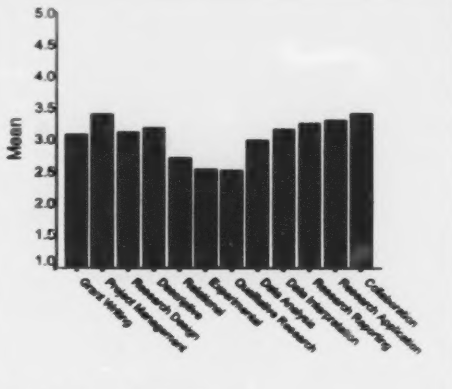

Figure 4. Research Planning Skills

Disciplinary skills in Agricultural Education related to teaching and learning were also self-rated by the respondents. Under the Needs Assessment category, four of the five items produced mean ratings above the 3.0 level (see Figure 5). However, Qualitative Assessment produced a mean rating notably lower (M = 2.75) than the other items in the category. Therefore, respondents revealed that they were less experienced with qualitative assessment that with other disciplinary skills included in the Needs Assessment category.

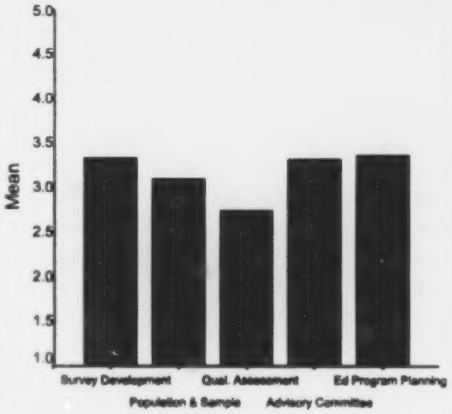

Figure 5. Needs Assessment

Within the category of Curriculum Development & Instructional Design (see Figure 6) respondents were asked to rate their level of expertise regarding six disciplinary skills. The highest rated skill was Developing Objectives (M = 3.68) and the lowest rated skill was Assessing Learning Styles (M = 2.86). Each of the skills in the Curriculum Development & Instructional Design category (with the exception of Assessing Learning Styles) produced mean ratings above the 3.25 level.

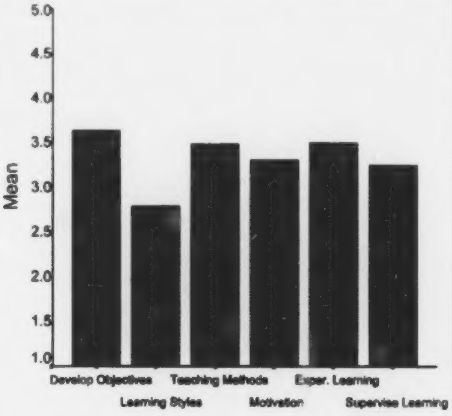

Figure 6. Curriculum Development & Instructional Design

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Figure 7 presents the mean ratings for six skills comprising the Information Transfer & Delivery category. The highest rated skill was Pedagogy (M = 3.54) and the lowest rated skill was Distance Learning (M = 2.75). Again, each of the six skills produced mean ratings which clustered around the 3.00 level indicating 'some expertise' in Information Transfer & Delivery.

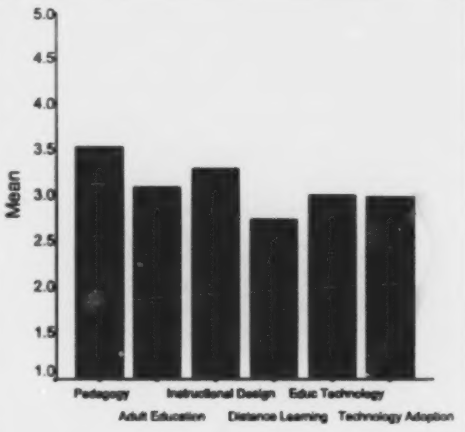

Figure 7. Information Transfer & Delivery

Ten skills were included in the category labeled Evaluation & Assessment which is presented in Figure 8. The highest rated skill in this category was Program Evaluation (M = 3.36) and the lowest rated skill was Performance Reporting (M = 2.69). Therefore, each of the ten skills in this category produced mean ratings that indicated respondents had 'some expertise' in each of the skill areas.

It was noted that for the 27 skills included in the four categories, individual responses ranged from 1 (no expertise) to 5 (expert) for each skill. This observation revealed that among Agricultural Education faculty respondents, there were some faculty who had no expertise, while other faculty considered themselves to be experts for each of the disciplinary skill areas assessed.

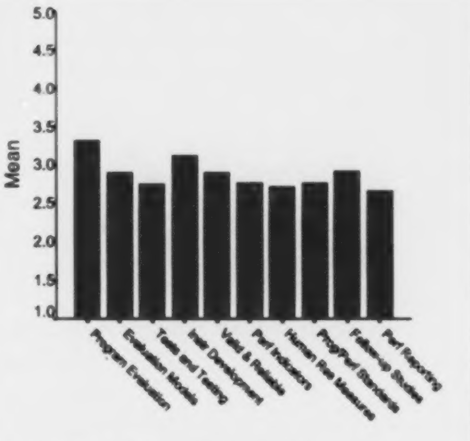

Figure 8. Evaluation & Assessment

Conclusions / Recommendations / Implications

Since the Agricultural Education faculty who provided responses for this study were not necessarily representative of the population of all Agricultural Education faculty, the conclusions which follow are limited to the respondents. Therefore, it is not appropriate to generalize these conclusions beyond those individuals who provided responses in this study. However, since this study was intended to provide baseline data, it is suggested that Agricultural Education faculty and administrators throughout the U.S. examine the potential implications of these findings and conclusions for themselves and their programs. Furthermore, leaders in the Agricultural Education profession may wish to examine the insights gained from this study, and move forward on a broader scale to assess the research capacity of all Agricultural Education faculty in order to facilitate generalization to the entire discipline.

Recognizing the limitation of generalizability, the following conclusions were formulated from this effort.

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1. **Agricultural Education faculty place a higher priority on teaching than research.**

From the data collected and summarized in this study, it appears that Agricultural Education faculty have relatively heavy teaching loads in comparison to their appointments in research. Often times, Agricultural Education faculty will also have heavy advisement responsibilities, both at the undergraduate and graduate levels. Each of these factors may weigh against a faculty members= time and ability to conduct research. Furthermore, the expectations of faculty, if they correspond proportionately with their appointment, would lead them to place more emphasis on teaching than on research. Over time, this situation has repeated itself across institutions, even in the face of faculty changes. Agricultural Educators have frequently been recognized and rewarded and for being excellent teachers and advisors, but often command less respect among their institutional colleagues for their research.

In addition to relatively heavy teaching loads, Agricultural Education faculty reported quite heavy assignments in administrative responsibilities. In fact, Agricultural Education faculty reported a larger percent of their appointment devoted to administration than to research. This situation would undoubtedly cause faculty members to divert their attention away from research, and splinter their efforts across multiple functions. Agricultural Education programs in most institutions have relatively small faculty FTEs which probably contributes to the relatively high proportion of the average faculty assignment devoted to administrative responsibilities. Although Agricultural Education faculty may be well suited to perform administrative tasks, the research capacity of the discipline is diminished as a result.

2. **There is wide variability among Agricultural Education faculty regarding authorship of research manuscripts, graduate degree advisement, and grant productivity.**

Common measures of research and scholarly productivity in higher education includes >numbers= of journal articles, research papers, graduate students, and grant dollars received. These easily quantified measures are not necessarily indicative of quality research, but they do allow for comparisons between and among faculty and programs in higher education. On a per faculty basis, the average Agricultural Education faculty member produced approximately one doctoral graduate and one refereed journal article every two years, nearly two masters graduates per year, and slightly more than one funded grant and one research paper per year. When viewed in proportion to faculty assignments, these figures may be reasonable levels of productivity. However, in the context of other faculty and departments in Land Grant Colleges of Agriculture, the numbers may seem low.

For Agricultural Education to elevate its status among peer faculty and programs, it must increase research productivity relative to the standard measures of comparison; i.e. research publications, graduate degrees awarded, and grants funded. Each faculty member should be encouraged to develop a focused research program which is goal oriented and specifies outcomes which are measurable for the purposes of comparison. Faculty hiring decisions should include consideration of each candidate=s record, plan, and potential for making a significant contribution to research efforts, both individually and as a member of multidisciplinary initiatives. Such considerations are important not only for improving the research capacity of Agricultural Education, but also affect the likelihood of the candidate being promoted and tenured at some point in the future.

3. **Agricultural Education faculty do not possess a core of research or disciplinary skills that characterizes expertise in the discipline.**

Although it was apparent that there were individual faculty in Agricultural Education who were considered experts in certain research and/or disciplinary skill areas; this study was unable to distinguish a core set of skills that were uniform across all faculty. This observation prompts several questions which should be addressed relative to further discussion related to enhancing research capacity in Agricultural Education. Is it reasonable to assume that all Agricultural Education faculty should possess a core set of research and/or disciplinary skills? If so, what should those skills encompass? How should those skills be developed in future generations of Agricultural Education faculty? How would those skills manifest themselves so that they can be documented and assessed in faculty hiring decisions? Each of these questions raise important issues which should be addressed by faculty members in Agricultural Education. The American Association for Agricultural Education (AAAE) should be encouraged to direct the Research standing committee to further examine this issue in an effort to enhance research capacity in Agricultural Education.

Based on the findings and conclusions derived from this study it is recommended that Agricultural Education faculty, administrators, and professional association leaders develop a plan to enhance the research capacity of Agricultural Education by:

1. **Conducting a comprehensive assessment of Agricultural Education faculty in the U.S. to determine >research capacity= from a disciplinary perspective.**Whereas this study collected data from a select group of institutions represented on the NCA-24 committee, there is need to summarize similar information from all faculty and institutions throughout the United States. Such a comprehensive study would provide a more solid foundation of empirical evidence upon which future decisions and recommendations should be based.
2. **Increasing faculty appointments and expectations in research.** Although this recommendation has obvious budget implications, there is a need to modify or increase the number of faculty FTEs in Agricultural Education that are devoted to research. Persons and Kajer (1995) noted that Agricultural Education departments throughout the United States had relatively few faculty with Experiment Station appointments. This finding is based on the assumption that land grant faculty who do not have an Experiment Station appointment, have reduced expectations for research productivity. Therefore, one logical strategy for increasing research productivity among Agricultural Education faculty is to add or increase the percentage of their appointment in the Experiment Station.
3. **Identifying opportunities to increase research manuscript authorship and grant funding among Agricultural Education faculty.** Increasing Agricultural Education faculty appointments in the Experiment Station would produce a major cultural shift in most departments and programs. Thereafter, it would logically follow that Agricultural Education faculty would be expected to increase their research productivity measures in the form of refereed journal articles, research papers, graduate degrees awarded, and grant funding
4. **Identifying and promoting core research and disciplinary skills which characterize Agricultural Education research and its potential contribution to interdisciplinary research initiatives.** As a profession, Agricultural Education should engage itself in the

process of defining its Aniche@ in research. Once identified, that message should be clearly communicated to colleagues and administrators. Networking and promoting research and disciplinary strengths of Agricultural Education are important prerequisites to developing collaborative relationships with others through interdisciplinary research initiatives. Colleagues in other departments need to know what and how Agricultural Educators can contribute to solving complex research problems and issues. Such a lack of understanding within the agricultural research community has caused Agricultural Education to frequently be overlooked as a potential collaborator.

5. **Encouraging Agricultural Education doctoral students to engage in interdisciplinary projects to prepare them for future involvement as faculty members.** The changing landscape of agricultural research suggests that faculty success in the future will be dependent on a different set of skills than was required in the past. Therefore, the programs which prepare future generations of faculty members need to change to keep pace with the changing expectations. Doctoral students should be encouraged (possibly even required) to engage in collaborative projects with students from other disciplines in order for all to experience the synergy that occurs when individuals from different perspectives and skill sets work together toward a common goal. These experiences are extremely important to prompt students to break out of their disciplinary mode of operation in order to recognize the strengths and limitations of other disciplines.

Research capacity is a somewhat nebulous concept, especially in the context of Agricultural Education programs. However, as a discipline, Agricultural Education has enormous potential to make significant contributions to complex research problems and issues. In order to realize its full potential, Agricultural Educators need to take a more proactive and assertive role in defining and enhancing research capacity within the profession.

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Assessing Research Capacity in Agricultural Education: A Case Study of NCA-24 Institutions

A Critique

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Contribution and Significance of Research

The authors are to be commended for advancing the dialogue about research capacity in agricultural education. The issue is an important one if we are to advance the scholarship of the discipline. Research productivity, faculty availability, and faculty capacity framed the case study. The introduction section identified well-documented criticisms about which we all should be reminded: internal focus, small proportion of dedicated time, narrowly conceived problems, and little interdisciplinary work.

Procedural Considerations

Central tendency statistics were used to report the research capacity. Perhaps frequency distributions would also be useful. For example, reporting that among the 73 faculty, nine perceived themselves as "expert" in a knowledge base such as needs assessment while 21 perceived themselves as a "novice" would be useful. Collaboration among experts in the knowledge base would likely improve. Would it be useful to develop a directory of faculty who commit to advancing one area in the knowledge base?

Questions for Consideration

The conclusions and recommendations section present difficult challenges. For example, the five recommendations present challenges of internal consistency. As a discipline, we are teachers who conduct research rather than researchers who teach. To increase research within a zero-sum system demands that other functions must decrease. What rewards are used to stimulate capacity building within each function? Are rewards available to increase efficiency in administrative, service, or teaching/advising functions? Would our capacity change with an admission or advising policy based on complementary graduate research areas? If we conclude that faculty do not possess a core of research or disciplinary skills, then how can we justify increasing faculty appointments in research?

Is the better strategy increasing Experiment Station (ES) appointments or increasing Experiment Station projects? Budgets for ES have little room for expanded appointments. However, there may be opportunities for leveraged interdisciplinary projects involving social responsibility. Can we use ES funds to leverage the research expectation of a teaching appointment?

What strategies are useful for interdisciplinary research? Should we reduce the amount of time researching Agricultural Education and increase the amount of time researching agricultural education, that is, real educational problems in the context of biotechnology, sustainable communities, and food safety? What are our disciplinary contributions to these three complex research areas that have emerged as priorities within the ESCOP Science and Technology committee? As a discipline, how can increase our capacity to collaborate with the broader science community in attacking complex problems that are important to our stakeholders?

For additional insights into these questions, one may want to visit the following WWW pages: http://www.wisc.edu/ncra/, http://www.nasulgc.org/, http://cristel.nal.usda.gov:8080/.

Assessing Research Capacity In Agricultural Education: A Summary Of Twelve Land Grant Program Administrators

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Abstract

The accomplishments of land grant colleges are well documented and have benefited the public for many years. Recommendations concerning the future direction of land grant research suggest an increased emphasis on interdisciplinary and collaborative research efforts. Before agricultural educators promote their involvement in interdisciplinary initiatives, they must first assess the unique skills they might offer. To determine the potential contributions that agricultural education offers the land grant research system, baseline data was collected. The primary purpose of the study was to assess the research capacity of agricultural education from the perspective of individual institutions and of the profession.

Data were collected from agricultural education faculty, primarily departmental administrators, representing 12 land grant institutions. Respondents were asked to provide institutional information regarding faculty, graduate students, research support staff, and research infrastructure. Another part of the data collection instrument required respondents to indicate the level of expertise within the agricultural education profession involving disciplinary skills.

The findings indicated a wide disparity among institutions in the number of agricultural education faculty employed, the number of graduate students, and the number of assistantships available. It was also concluded that agricultural education programs have access to a wide range of research support staff and infrastructure resources. In general, these institutional resources appeared to be adequate in meeting the needs of researchers. Further, the respondents characterized the agricultural education profession as possessing expertise with a number of disciplinary skills.

More faculty appointments were recommended to conduct research and mentor graduate students in the scholarly process. Tenured faculty were encouraged to continue to conduct and publish research studies. It was suggested that graduate programs be designed to include collaborative research projects and activities in order to prepare doctoral students for their future involvement as faculty members.

Further recommendations were to communicate to Experiment Station Directors and Land Grant College Administrators the research skills and potential contributions that agricultural education offers for building collaborative efforts. Therefore, faculty should prepare graduate students so that they develop research expertise in the disciplinary skills the profession has identified as its strengths. However, further study was needed to assess the research capacity of the entire profession.

Introduction / Theoretical Framework

Land grant colleges were created in 1862 when President Abraham Lincoln signed the Morrill Act. As a result of this legislation, financial support in the form of federal land helped create colleges of agriculture in each state. The Morrill Act mandated " . . . learning as related to agriculture and the mechanic arts . . . " and was designed " . . . to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life" (Morrill Act, 1862, p. 503). The creation of land grant colleges was in contrast to the emphasis in higher education on the classics, philosophy, and theology (Meyer, 1993). The concept of practical education for citizens of ordinary means was initiated through the Morrill Act.

In passing the Hatch Act in 1887, Congress recognized the need for research as a basis for developing agriculture. Federal funding was authorized for the creation of an agricultural experiment station in connection with each land grant institution. The Hatch Act charged that experiment stations would be responsible for " . . . acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science . . . " (Hatch Act, 1887, p. 440). The Hatch Act allowed the United States Department of Agriculture to assist agricultural education during its early development. Teachers received instructional publications, bulletins, and experiment station results in an effort to integrate science into the agricultural education curriculum (Ekstrom, 1969). Hillison (1996) reported that the Hatch Act provided the " . . . impetus for the first agriscience programs in the United States" (p. 9).

In 1914, Congress passed the Smith-Lever Act, providing for cooperative extension to take information directly to farmers. By advising them on how to translate and use experiment station research information, a grass-roots link was established with farmers and local communities. The Smith-Lever Act provided a coordinated partnership (i.e., cooperative extension) among county, state, and federal governments, which was instrumental in establishing a statewide system of extension programs (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996).

The land grant mission of teaching, research and extension is thus a result of the 1862 Morrill Act, the 1887 Hatch Act, and the 1914 Smith-Lever Act. After the passage of the Morrill Act, many agricultural leaders were of the opinion that the establishment of land grant colleges would solve the problem of educating farm people in agriculture. Any student who wanted to learn agriculture would simply attend the land grant college (Moore, 1987). In the early 1900s, people began to realize that it was impossible to deliver agricultural instruction from the campus of only one institution in the state. The Smith-Hughes Act of 1917 was intended to overcome this problem. As a result, the act specifically established agriculture in secondary schools, and provided funds for teacher salaries and teacher training (Phipps & Osborne, 1988).

The history of research in agricultural education is of a more recent era. It was not until 1960 that the Journal of the American Association of Teacher Educators in Agriculture, now known as Journal of Agricultural Education, was first published. The first National Agricultural Education Research Conference was held in 1974. And in 1985, the North Central Regional Association of State Agricultural Experiment Station Directors approved an agricultural education research advisory committee (NCA-24 Committee, 1987). The purpose of the NCA-

24 Committee was to advise Directors on regional research issues related to agricultural education.

The public has benefited from the historical accomplishments of land grant colleges for many years. However, concerns have been raised about the tripartite structure, and the ability to adapt to the U.S. public's changing needs and priorities (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996; Meyer, 1997). "It's not business as usual" (Board on Agriculture, 1996, p. 1) was the most common phrase made by customers of land grant colleges when defining future direction and strategy. The motivation for this study is based on the need to be aware of the land grant research challenges for the 21st century, and decide how agricultural education can become a contributing partner in future research efforts.

Recommendations concerning the future direction of land grant research suggested an increased emphasis on inter- and multidisciplinary research, and noted the need for collaboration across disciplines, institutions, and states (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996). Team research that produces useful answers, and other interdisciplinary approaches have been recommended as priorities for the land grant system (Board on Agriculture, 1996). Indeed, the agricultural education profession has received similar advice. Jordan (1993) argued that research in agricultural education should extend beyond its disciplinary confines to address larger and more significant research problems.

Members of the profession have recommended a widening of collaborative research partnerships among institutions and states (NCA-24 Subcommittee on Agricultural Education Research, 1997). Williams (1991) suggested that partnerships with agencies, industry, and teams of researchers would promote interdisciplinary research. He contended that multiple researchers who provide unique expertise and resources could better conduct research projects.

How does the profession fare in its research efforts within the land grant system? According to a national study of Agricultural Education Departments in the United States (Persons & Kajer, 1995), 16 of the 80 responding institutions reported research projects within their departments being conducted with experiment station funds. Institutions reported a total of 36 research projects being conducted, with most of the projects related to teacher preparation themes.

Prior to communicating the research skills and potential contributions that agricultural education offers for building collaborative efforts, it was necessary to first assess its research capacity. MacKenzie (1997), finding no conceptual framework for measuring institutional research capacity, utilized concepts from the private sector. He suggested that a strategic architecture could be developed within an institution and within a region by identifying core competencies through an assessment of institutional capacity. As a result, planning strategies become more obvious, collaborations and partnerships become strategic, and opportunities for resource efficiencies enhanced.

It was appropriate and timely to evaluate the research capacity of agricultural education in order to position the discipline for future involvement in land grant research. This study was conducted to collect baseline data to assist with this process.

Purpose / Objectives

Research is the basis for many of the principles of agricultural education. As the profession seeks to conduct collaborative research within land grant colleges, it must first assess its capacity to become a contributing partner in the process. The purpose of this descriptive study was to assess the research capacity of agricultural education from the perspective of individual institutions and of the profession. The specific research objectives were to:

1. Determine the human resources available to contribute to research programs involving agricultural education.
2. Determine availability and adequacy of research support and infrastructure.
3. Identify disciplinary strengths in agricultural education.

Methods / Procedures

Members of the NCA-24 Committee on Research in Agricultural Education played a key role in the data collection process. Agricultural Education faculty, primarily program administrators, from each of the land grant institutions in the North Central Region comprised the committee. The twelve states in the North Central Region included: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. In addition, three states from outside the region (i.e. Arkansas, Oklahoma, and Texas), were full members of the NCA-24 Committee and also provided data.

The data collection instrument was created by a NCA-24 subcommittee in response to a charge to assess the research capacity of agricultural education. During a period of several months, multiple drafts of the instrument were developed and modified as a result of email, face-to-face, and telephone communications. The NCA-24 committee reviewed the instrument and served as the expert panel to examine the validity of the instrument.

Members attending the NCA-24 Committee on Agricultural Education Research in February 2000 were asked to participate in the data collection process. Each representative completed the instrument based on their view of agricultural education research capacity at their respective institution and of the profession.

The data collection instrument was comprised of two parts. The first part asked respondents to provide information regarding research capacity in agricultural education at their institution. One section requested the number of faculty Full Time Equivalents (FTEs) by rank and tenure status. Another section asked for the number of full time graduate students and their level of assistantship (i.e., none, ¼ time or ½ time). In the last section, respondents were asked to identify the availability and adequacy of 17 institutional research support items. These items were organized under two categories: support staff and infrastructure. Respondents were to answer ‘yes’ or ‘no’ regarding the availability and adequacy of each item at their respective institution.

The second part of the data collection instrument asked respondents to indicate the level of expertise within the agricultural education profession involving various disciplinary skills. Twenty-seven disciplinary skills were organized into four categories labeled: Needs Assessment, Curriculum Development & Instructional Design, Information Transfer & Delivery, and

Evaluation & Assessment. Respondents rated each research skill using the following scale values: 1 = none, 2 = little, 3 = some, 4 = much, and 5 = expert.

Data were entered into a personal computer and analyzed using SPSS 10.0. Descriptive statistics were used to summarize and analyze the data since the purpose of the study was to describe the characteristics of the respondent's institution and the profession.

Results / Findings

Data collection instruments were received from 12 agricultural educators representing 12 states. Respondents reported a total of 96.7 FTE agricultural education faculty employed at the 12 land grant institutions. This total consisted of faculty FTEs in the following ranks: 11.5 Instructors (11.9%), 28.5 Assistant Professors (29.5%), 24.7 Associate Professors (25.5%), 27.1 Professors (28.0%), and 5.0 Others (5.2%). The average number of faculty by rank in each institution were as follows: 1.0 Instructors, 2.4 Assistant Professors, 2.1 Associate Professors, 2.3 Professors, and .4 Others. An average of 8.2 faculty were reported at each institution, however the range was from 1 to 31. Six of the 12 institutions surveyed had three or fewer faculty FTEs in their agricultural education program.

Agricultural education respondents indicated that slightly over half (52.9%) of the faculty were tenured. The remaining faculty were almost evenly split between those who were not on a tenure track (24.6%), and those who were on a tenure track but had not yet been awarded tenure (22.5%).

Respondents indicated there were 279 full-time graduate students at the 12 institutions. This may provide an indication of the human resources available to assist with research. However, a wide disparity in the number of full-time graduate students at each institution existed. Two institutions reported no graduate students were enrolled, while one institution reported 71 full-time graduate students.

As indicated in Table 1, 43.0% of full-time graduate students were pursuing a Master's Degree and had no assistantship available (n=120). Only 11.9% of the full-time graduate students were receiving an assistantship while completing their Doctoral Degree (n=33). There was a wide range in the number of doctoral assistantships available at each institution. Three institutions reported no doctoral assistantships available, two institutions reported only one assistantship, and two other institutions reported 8 and 10 doctoral assistantships, respectively.

Table 1
Number and Percent of Full-Time Graduate Students in Agricultural Education by Level of Assistantship (n = 279)

Degree Program	Assistantship Level	n	%
Masters	None	120	43.0
Masters	1/4 time	21	7.5
Masters	½ time	40	14.3
Doctoral	None	65	23.3
Doctoral	1/4 time	6	2.2
Doctoral	½ time	27	9.7

All respondents (100%) indicated that research support staff were available in the following categories: secretarial/clerical, project management (budgeting, accounting, reporting, etc.), computer assistance, and research data analysis (Figure 1). The lowest rated item was manuscript preparation assistance, as only 55% of institutions reported that support staff were available to assist with preparing manuscripts for publications or grant proposals.

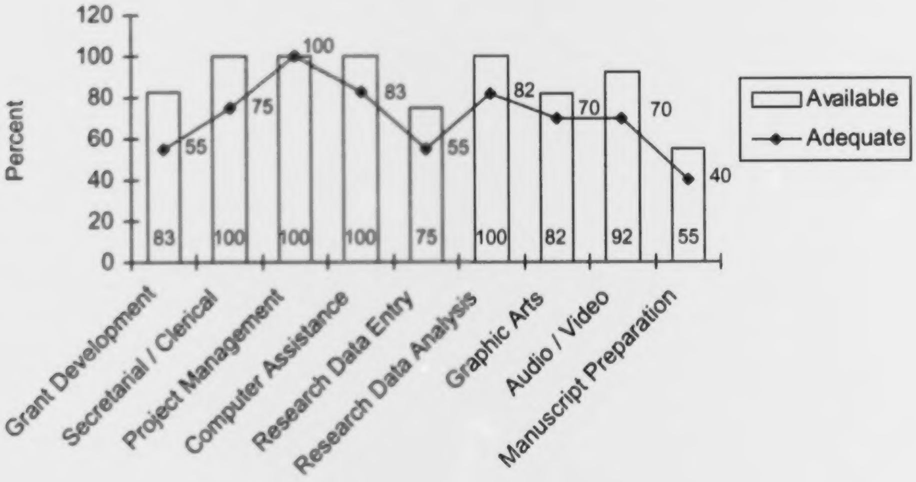

Figure 1. Availability and adequacy of research support staff.

As shown in Figure 1, project management (budgeting, accounting, reporting, etc.) was the only support staff category that all institutions rated as adequate. The next highest rated categories were computer assistance (83%) and research data analysis (82%). Institutions rated manuscript preparation the lowest support staff category, where only 40% of the respondents reported it as adequate. Other support staff categories considered inadequate were grant proposal development (55%) and research data entry (55%).

All institutional respondents (100%) reported that research infrastructure was available for all items except for publication support (funding for journal page charges), which was available at 90% of the institutions (Figure 2). In rating the adequacy of research infrastructure, only two items received a 100% rating: Internet access, and printing / duplication facilities. The lowest rated infrastructure item was distance learning facilities, as 67% of respondents indicated it was adequate (Figure 2).

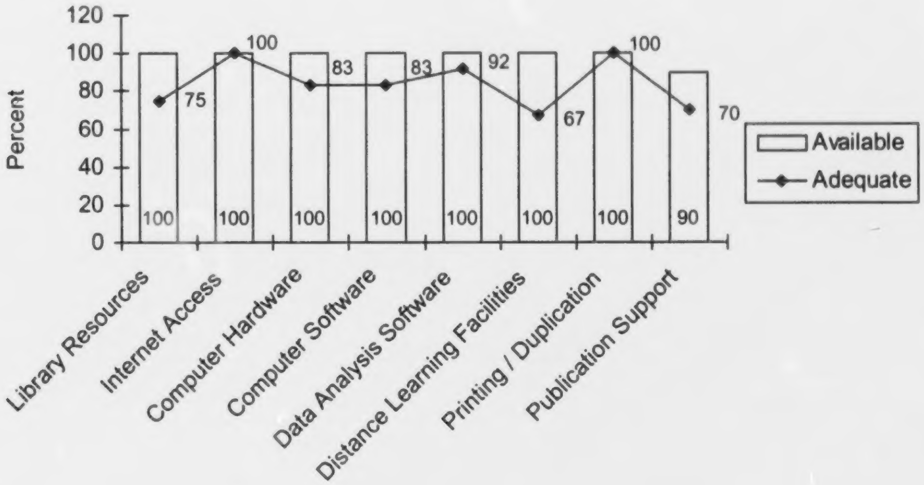

Figure 2. Availability and adequacy of research infrastructure.

Respondents were asked to rate the disciplinary skills related to teaching and learning in the context of the entire agricultural education profession. Mean scores for disciplinary skills are reported in Table 2. In the Needs Assessment category, four of the five skills earned mean ratings above 3.67. Survey instrument development earned the highest mean rating of 4.00. Respondents rated qualitative assessment notably lower (M = 2.92) than the other disciplinary skills in the category.

Within the category of Curriculum Development & Instructional Design (Table 2), respondents were asked to rate the profession's level of expertise regarding six disciplinary skills. Four of the six skills earned a mean score above 3.92, substantially higher than the two lowest rated disciplinary skills. Experiential learning (M = 4.17) and developing objectives (M = 4.00) produced the highest means, while motivation (M = 3.00) and assessing learning styles (M = 2.83) produced the lowest means.

Four of the six disciplinary skills in the Information Transfer & Delivery category clustered around a mean level of 2.90 (Table 2). Respondents rated pedagogy (M = 3.92) and adult education (M = 3.50) the highest.

Ten disciplinary skills were included in the Evaluation & Assessment category (Table 2). All skills earned mean ratings between 3.08 and 3.67, thus creating the most uniform scores among the four disciplinary categories.

Table 2
Mean Expertise Ratings of Disciplinary Skills Related to Teaching and Learning

Disciplinary Category / Disciplinary Skill	M[a]	SD
Needs Assessment		
Survey Instrument Development	4.00	0.60
Educational Program Planning	3.83	1.03
Population and Sampling Procedures	3.67	0.65
Advisory Committee Operation	3.67	1.16
Qualitative Assessment	2.92	0.79
Curriculum Development & Instructional Design		
Experiential Learning	4.17	0.84
Developing Objectives	4.00	1.13
Teaching Methods	3.92	1.17
Supervision of Learning	3.92	1.24
Motivation	3.00	1.04
Assessing Learning Styles	2.83	1.19
Information Transfer & Delivery		
Pedagogy	3.92	0.79
Adult Education	3.50	1.00
Instructional Design	3.00	1.13
Distance Learning	2.92	1.08
Educational Technology	2.83	1.12
Technology Adoption	2.75	1.42
Evaluation & Assessment		
Program Evaluation/Review	3.67	0.99
Program and Performance Standards	3.58	0.79
Validity and Reliability	3.42	0.79
Performance Indicators	3.42	1.17
Follow-Up Studies	3.42	1.00
Instrumentation	3.33	0.78
Performance Measures	3.27	1.10
Performance Reporting	3.17	0.84
Evaluation Models	3.17	1.12
Tests and Testing	3.08	1.00

[a] 1 = none, 2 = little, 3 = some, 4 = much, 5 = expert

Examination of the data revealed that the disciplinary skills received a wide range of scores from the respondents. Of the 27 skills assessed, 14 received ratings that ranged from 1 (no expertise) to 5 (expert). Further, each of the 27 disciplinary skills received an 'expert' rating from at least one respondent.

In order to further assess the disciplinary strengths of agricultural education, the five point Likert-type response scale was divided into thirds. This resulted in scale ranges of 1.00 to 2.33, 2.34 to 3.66, and 3.67 to 5.00 that were categorized low, medium and high, respectively. Disciplinary strengths were identified by selecting those skills that produced means in the high category (between 3.67 and 5.00). Table 3 reveals the disciplinary strengths of the agricultural education profession as perceived by the twelve NCA-24 committee members.

Table 3
Disciplinary Strengths of Agricultural Education

Disciplinary Category	Disciplinary Skill
Needs Assessment	Survey Instrument Development Educational Program Planning Population and Sampling Procedures Advisory Committee Operation
Curriculum Development & Instructional Design	Experiential Learning Developing Objectives Teaching Methods Supervision of Learning
Information Transfer & Delivery	Pedagogy
Evaluation & Assessment	Program Evaluation/Review

Results of the survey indicated that 10 skills were categorized as disciplinary strengths. There were 17 skills that produced means in the 'medium' category, and no skills produced means in the 'low' category (i.e., below 2.34).

Conclusions / Recommendations / Implications

The findings from this study provide a baseline indication of institutional and disciplinary research capacity in agricultural education. Identifying the human resources, research support and infrastructure, and disciplinary strengths may enable the agricultural education profession to determine its unique contribution to research. Based on the responses of agricultural education program administrators at the 12 land grant institutions represented on the NCA-24 Committee, the following conclusions were drawn.

The combined efforts of faculty and graduate students are needed to conduct research. The current study indicates there is a wide range of FTE agricultural education faculty employed at institutions. This aligns with previous research by Persons & Kajer (1995), who reported the number of agricultural education faculty varied widely throughout the United States. Graduate students are an important human resource who contribute to research capacity in agricultural education. A sizable number of graduate students are pursuing advanced degrees in agricultural education, however there is a wide disparity among institutions in the number of full-time graduate students, and the number of assistantships available to support them.

Agricultural education programs have access to a wide range of research support staff and infrastructure resources. It appears that these resources are meeting the needs of a significant number of respondents. However, several areas appear to be inadequate, which may limit the productivity of agricultural education researchers.

The agricultural education profession can be characterized as possessing expertise with a number of disciplinary skills. A majority of the disciplinary strengths are identified in the categories of Needs Assessment, and in Curriculum Development & Instructional Design. To a lesser extent, disciplinary strengths can be identified in the disciplinary categories of Information Transfer & Delivery, and Evaluation & Assessment.

Although the findings of this study can only be applied to the agricultural education programs that provided responses, the potential implications may be of interest to the broader profession. Agricultural education faculty and administrators located at land grant colleges in other states and regions may be particularly interested in these findings. Therefore, the following recommendations are offered to improve the research capacity of agricultural education.

The number of agricultural education faculty should be increased to allow for more research activities. This is especially true at institutions that have a small number of faculty, and where teaching and other duties are likely to dominate faculty members' time. More faculty are needed to conduct research, and mentor graduate students in this scholarly process. Tenured faculty should be encouraged to continue to conduct and publish research studies. This segment of the profession can provide leadership by sharing their research focus and expertise. Opportunities to provide graduate assistantships at all institutions should be identified. Increasing support for more graduate students to assist with research studies should enhance research capacity within each institution. Graduate programs should also be designed so that collaborative research projects and activities are provided to prepare doctoral students for their future involvement as faculty members.

Agricultural education departmental administrators should seek to increase support staff specifically to assist with manuscript preparation. There is a need to improve the 'adequacy' of support staff for manuscript preparation, grant proposal development, and research data entry. Distance learning facilities should also be improved in order to better meet the research infrastructure needs of agricultural education programs.

The findings of this study indicated that the Agricultural Education discipline possessed expertise in several disciplinary skill categories. The unique strengths of the profession were identified in order to specify potential contributions to collaborative research initiatives. Promoting disciplinary strengths with Experiment Station Directors and Land Grant College Administrators may prompt them to consider agricultural educators as potential collaborative research participants.

The profession enjoys the reputation for effective teaching and advising at many universities. This desirable characteristic may at times overshadow the potential contributions the discipline offers in collectively solving research problems. Communicating the disciplinary strengths to colleagues in other departments may serve to enhance the research capacity of the profession. Faculty should prepare graduate students to develop research expertise in the disciplinary skills the profession has identified as its strengths. The researchers suggest that further study is needed to assess the research capacity of other regions of the United States, and the entire profession.

The implications of this study are important for agricultural education faculty, land grant college faculty, and administrators across the United States. Recognizing the continuing need for research focused on disciplinary problems, agricultural educators should engage in more collaborative research. Future research will consist of "... multistate, multi-institutional, and multidisciplinary collaborations and partnerships (i.e., a 'new geography' for the land grant system)" (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996, p. 21). Now is the time for the agricultural education discipline to consider its role in becoming a full partner in this new research mission.

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Assessing Research Capacity in Agricultural Education: A Summary of Twelve Land Grant Program Administrators

A Critique

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Contribution and Significance of Research

The perspectives of twelve land grant program administrators are useful in developing a strategic plan for research in agricultural education. However, there was substantial disparity in each of the primary measures among the programs. There is substantial human capacity within the twelve programs. When articulated, 96 faculty and 279 full-time graduate students represent potential. What strategies would articulate high priority educational research problems within the context of biotechnology, sustainable communities, and food safety? How can networks be developed that would collectively address important problems?

Questions for Consideration

With three exceptions among the 12 programs, there was a somewhat adequate and available research support staff. What strategies are useful to increase adequate grant development, research data entry, and manuscript preparation? Also, with three exceptions, there was a somewhat adequate and available research infrastructure in place. What strategies are useful to increase distance-learning faculties, publication support, and library resources? The authors provide a valuable description of disciplinary categories and skills. However, the perspective is one of content. Gray noted that learning has shifted from knowledge as matter to knowledge as practice. "So, whereas the conventional wisdom of the old economy was that 'content is king,' in the new economy, context is king" (Gray, 2000). So the question arises: What are the contextual settings that are appropriate for our disciplinary skills?

The authors recommend increased communication to Experiment Station Directors and LGC Administrators about the research skills currently held and the potential for collaboration. Further, they encourage us to describe our strengths in four categories: "needs assessment, curriculum development and instructional design, information transfer and delivery, and evaluation and assessment." How can we also communicate our contribution in the inquiry of important stakeholder research?

Benchmarks for success in research and scholarship include: (1) stakeholders who advocate investments in social science research pertaining to agricultural education and communicate the value of the research to policy makers, (2) faculty who focus on relevant problems within their knowledge base and dedicate appropriate time to inquiry, (3) faculty who encourage graduate students to join in their personal research agenda and contribute to greater solutions, (4) congruence [exists] between research conducted by the faculty and graduate students and in the contextual applications in which they work, and (5) faculty working collaboratively within an interdisciplinary team to address pedagogical issues related to teaching and learning research associated with production efficiency, economic viability, emerging trends, environmental compatibility, and social responsibility" (Strategic Framework, 2000).

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Expanding the Agricultural Education Research Toolbox: A Case for an Interpretive Perspective

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Abstract

Assumptions underlying two distinctly different paradigms – positivism and interpretivism — currently guide educational research. Although acceptance of interpretivism is increasing within education, positivism remains the dominant paradigm for both education and agricultural education. In an effort to increase the potential for naturalistic inquiry, this paper (1) provides an understanding of the philosophical foundation underlying interpretivism, (2) argues that a distinction exists between methodology (positivism, interpretivism) and method (quantitative, qualitative), with the former more critical than the latter, (3) proposes that agricultural education fits well with the interpretive paradigm and qualitative methods, and (4) outlines what this approach would look like in practice in terms of research design, data collection, data analysis, and rigor. The intent is to inform practice as well as to clarify criteria appropriate for assessing the merit of agricultural education research based upon the interpretive model.

Mark Twain once said that if the only tool one has is a hammer, then one tends to treat everything as if it were a nail. Whereas a hammer is the best choice for driving nails, it becomes less useful for a bolt or screw and basically useless for a twist tie or tape. Twain's logic especially applies to the research methods used in agricultural education. For years, agricultural education researchers have hammered with one research paradigm, positivism, as if all topics of inquiry were nails. Currently, the tools for realizing the full potential for agricultural education research remain locked in the toolbox.

A Look at the Toolbox — Differing Perspectives

For close to two decades leaders in agricultural education research have called for an examination of our beliefs, concepts, attitudes, and basic premises for research (McCracken, 1983; McCormick, 1984). More specifically Miller (1991) and Newcomb (1993) have called for recognition of creative efforts, theoretical writings and a greater connection between scholarship and teaching. To move towards the type of scholarship suggested by these seminal leaders, Wardlow (1989) argued that we should look beyond the dominant mode of inquiry that may inhibit our innovation and development of intellectual pursuits.

We contend that this concern for the inclusion of alternative forms of scholarship is manifested in the ongoing debate over the relative merits of what are generally referred to as positivist and interpretivist research paradigms. Thus this concern is clouded by two problems: (1) a lack of coherent definitions, and (2) the focusing of most discussions on methods instead of on the basic assumptions of these two stances. We argue that the second problem is at the root of the confusion, and the first is a manifestation of it.

A key issue in the paradigm debate centers on the "unity of the sciences" (Smith, 1983). Are the natural and social sciences basically the same or are the subject matters inherently different? Interpretivist challenges to contemporary positivism can be compared with earlier efforts (marked by years of conflict and debate) to applying the model of the natural sciences to the study of people. The underlying assumptions and methods of the social sciences were, in many cases, transformed as social scientists, adhering to a positivist view of modern science, sought to emulate their colleagues in the natural sciences. Smith (1983) described how "this school of thought claimed that social investigation was a neutral activity in regards to values, and accordingly, social scientists conducting research should (1) eliminate all bias and preconceptions, (2) not be emotionally involved with or have a particular attitude toward the subject, and (3) move beyond common-sense belief" (p. 7). This last decree meant that social scientists should develop a neutral scientific language and be strictly confined to discussing the "what is" (that which is objective) of the social world and avoid the "what should be" (that which is subjective).

However, shortly after the idea of using the natural science's approach to study the human world took root, a countermovement grew. The appearance of another school of thought — interpretivism — challenged the positivist paradigm and gave impetus to employing different methods within the social sciences. Dilthey (1988) contended that the complexity of the social world changes over time and cultural differences make it impossible to discover laws as in the natural sciences. Instead he believed emphasis should be placed on understanding the individual or type. He suggested "the social sciences must be descriptive as opposed to explanatory or predictive and must concentrate on interpretive understanding" (Dilthey, 1988, p. 152).

To shed further light on the differences between these approaches to understanding, Bernstein (1976) described the distinction between the positivist and interpretivist paradigms in terms of how theorists account for "man-in-the-world," either through a "scientific image" or through a "manifest image." Bernstein stated:

> those who endorse the scientific image maintain that science will provide not a partial but a complete account, which can in principle, if not yet in fact, explain even the "indispensable core" of human concepts, by showing how they are based on more fundamental scientific principles. And those who endorse the manifest declare not just that a scientific account of man is incomplete, but that, if we "subject science itself to rigorous scrutiny," we will see in it a second-order discipline based on a more fundamental understanding of man-in-the-world (p. 120).

The first view perceives human beings as complex physical systems differing from the rest of nature not in kind but perhaps in degree. Therefore, the products of science can provide explanations for how the system works. Inadequate explanations appear as temporary setbacks rather than failures. The alternative perspective counters that "scientific points of view are always both naive and at the same time dishonest and that failures in science indicate deep conceptual or categorical confusions" (Bernstein, 1976, p. 121).

This contrasting epistemological base allows for a range of research perspectives, or paradigms that includes both positivism and interpretivism. Each differs on basic underlying assumptions that ultimately guide choices about research methodologies and methods. The literature offers a variety of summary charts (Guba and Lincoln, 1981; Koetting, 1986; Lincoln and Guba, 1985) and discussions (Comber, 1988; Eichelberger, 1989; Smith, 1989) that attempt to clarify the differences. Table 1 provides a comparison of these five assumptions.

Table 1

Contrasting Views Underlying Alternative Research Paradigms

Underlying assumptions and beliefs about:	Positivism	Interpretivism
Purpose(s) of research	Discover laws and generalizations that explain reality and allow to prediction and control	Understand and interpret daily occurrences and social structures as well as the meanings that people give to the phenomena
Nature of reality	Single, given, fragmentable, tangible, convergent, measurable	Multiple, constructed through human interaction, holistic, divergent
Nature of knowledge	Events are explained by knowable facts, real causes or simultaneous effects; law-like regularities exist	Events are understood through mental process of interpretation, which is influenced by and interacts with social context – mutual, simultaneously shaping
Relationship between the knower and the known	Independent, dualism	Interrelated, dialogic
Roles of value(s) in research	Value free	Value bound

Based on these assumptions, general characteristics of interpretivism become evident. These researchers seek to understand phenomena and to interpret meaning within the social and cultural context of the natural setting. Unlike positivists who believe that reality exists apart from the researcher and is knowable, interpretivists hold that reality is constructed. In fact, "inquiry is not a matter of offering interpretations of reality, but one of offering interpretations that become reality, to the extent they are agreed upon" (Smith, 1989, p. 171). In contrast with positivists, interpretivists seek subjective perceptions of individuals. Carr and Kemmis (1983) emphasized that to identify the actor's "motives and intentions correctly is to grasp the 'subjective meaning' the action has for the actor" (p. 88).

In order to uncover what people believe and then render meaning about their actions and intentions, interpretive researchers often interact dialogically with the participants. Within this interrelationship, values cannot be sidestepped. Unlike positivists who attempt to separate values from facts and offer explanations of reality, which are empirically verifiable, interpretivists accept the inseparable bond between values and facts and attempt to understand reality, especially the actions of people, within a social context.

Selecting the Most Suitable Tool — Methodology vs. Methods

In studying Table 1, one can quickly recognize his/her preferred research paradigm. The intent here is not to assist researchers in cementing their own philosophical entrenchments but to provide philosophical lens that enlighten their view and, in turn, lead to an acceptance of the wider array of methodologies available to agricultural education researchers.

Current literature and conference sessions abound with discussions that examine different paradigms, quantitative versus qualitative research, and approaches most appropriate for educational research. Smith and Heshusius (1986), in tracing the evolution of concern, outlined three historical phases that researchers traverse on the trek to alternative epistemologies and their supporting methods of inquiry: (1) conflict where proponents so strongly recognized the fundamental differences in assumptions, procedures and attitudes that they often approached mutual disdain; (2) détente in which proponents, while accepting paradigmatic differences, decreased their concern over underlying assumptions and increased their concern over issues of procedure; and (3) compatibility and cooperation where proponents' concerns over assumptions are minimal and those related to procedure are primary. Although Smith and Heshusius suggested that the latter represents the current state of affairs in most fields of education, we contend that most in our discipline still lay somewhere between the first and second phase. Jayaratne and Martin's (2000) finding that agricultural education researchers believe that qualitative studies are more scrutinized and harder to publish than quantitative studies support this premise.

This concern has also emerged in the broader educational milieu. Miles and Huberman (1988) argued that researchers should pursue their work, be open to a blend of epistemologies and procedures, and leave the grand debate to those who care most about it. They support this position on the grounds that the debate is unlikely to be resolved at any time soon and that epistemological purity does not generate new knowledge. In contrast to Miles and Huberman, Fetterman (1988) addressed the misleading nature of the terms "quantitative" and "qualitative" when he wrote, "they are commonly accepted handles for both the contrasting paradigms and the methods associated with them. However, each paradigm employs both quantitative and qualitative methods. Focusing on methods, however, is like focusing on the symptoms rather than the disease" (p. 18).

An Interpretive Toolbox for Agricultural Education Research

Whereas the positivist paradigm remains dominant in education, the interpretive perspective has gained much wider acceptance over the past decade (Fetterman, 1988; Firestone and Dawson, 1988; Lincoln and Guba, 1985; Smith, 1987). Likewise, agricultural education's complex nature — entangled in interrelationships, replete with social and natural science context, and laden with values — demands that an alternative paradigm drive research. Based on the previously discussed underlying assumptions, the use of interpretive epistemologies and subsequent methods appears not only appropriate, but also long overdue.

Although the momentum for change exists for other social sciences, agricultural education seems to lag behind in the acceptance of the interpretivist paradigm. This results, in large part, perhaps, from its connection to the natural sciences. This alliance with disciplines such as agronomy, animal science and horticulture may initially seem reasonable, but with its emphasis on people, agricultural education subject matter and research encompasses more of the social sciences than the natural sciences. Although much of the following discussion is relevant to positivist and interpretivist paradigms, the primary focus is on interpretivism.

How the Interpretive Inquirer Uses the Agricultural Education Research Toolbox

The appearance of the interpretive paradigm in education signals more than another novel academic paradigm (Guba & Lincoln, 1981). Rather, "a radically new and different cultural movement is coalescing in a broad-gauged re-conceptualization of how we experience and explain the world around us" (Rosenau, 1992). In its most extreme formulation, interpretivism is revolutionary; it goes to the very core of what constitutes social science and radically dismisses it (Smith & Heshusius, 1986). In its more moderate proclamations, the interpretive paradigm encourages substantive re-defining and innovation (LeCompte & Goetz, 1982). Taken together, both the extreme and moderate approaches constitute one of the greatest intellectual challenges toward the selection of methodologies that provide the means to find and construct knowledge that actually helps people.

As discussed previously, one's epistemology (e.g., the interpretivist paradigm) guides choices concerning the selection of research methods. An understanding of the appropriateness of qualitative inquiry depends on an understanding of the assumptions underlying the interpretivist paradigm. Although interpretive studies are not limited solely to the use of qualitative methods, they are recognized as the methods most typically used (Guba and Lincoln, 1981; Patton, 1990).

Generally, qualitative research can be characterized as the attempt to obtain an in-depth understanding of the meanings and definitions of human situations. The term "qualitative research" is used synonymously for a number of research approaches associated with the interpretivist perspective. These include, for example, naturalistic, ethnographic, phenomenological, hermenuetics, case study, action research, participatory, and emancipatory (Jacob, 1987; Lincoln and Guba, 1985; Patton, 1990; Peshkin, 1988).

A major reason these methods have not seemed appropriate for agricultural education is because they are viewed through a positivist lens. Maykut and Morehouse (1994) recognized that the adoption of qualitative methods might invite hostility from those ingrained with positivistic beliefs. This is because they often view the objectivity of quantitative research as "synonymous with good research," and the subjectivity inherent in qualitative research as "synonymous with "sloppy" and "unscientific" research (p. 19). Arguments over "quality" or the perceived lack of quality in a study hinge upon the inherent philosophical differences discussed throughout this paper.

Linking Theory to Practice through an Interpretive Perspective

To move discussion from theory to practice, the remainder of this paper provides a brief overview of: (1) research design, (2) data collection, (3) data analysis, and (4) rigor with an emphasis on the underlying assumptions of interpretivism and the use of qualitative methods. The purposes are twofold: (a) to translate the theoretical discussion into practice and (b) to provide a lens to view and assess the merit of research based on an interpretivist paradigm.

Research Design

The design of an interpretive (qualitative) study differs substantively from that of a positivist (quantitative) study. However, the degree to which it differs reflects the aforementioned lack of consensus regarding the blending of methodologies and method. The following highlights the range of possibilities and hopes to clarify differences in an effort to explain current practice. The discussion addresses three topics related to design: (1) degree of structure, (2) focus and research questions, and (3) sampling.

Degree of Structure

In the classic sense, the research design for an interpretive study often times begins as a broad outline of contingency-plans that are open to change throughout the course of study. An emphasis on emergent design and researcher flexibility characterizes this approach. Plans, research questions, theories, data collection strategies, and analysis evolve from the beginning standpoints as the researcher learns more about the study's people, places, events and processes. Based on the underlying assumptions, Lincoln and Guba (1985) have suggested that "design of a naturalistic inquiry cannot be given in advance; it must emerge, develop, unfold" (p.225). In determining the appropriate degree of structure, the researcher needs to consider what is being studied, the purpose, and underlying assumptions.

Focus and Research Questions

Although the researcher needs an initial focus, it often times changes over time. Viewed positively, these changes "signal movement to a more sophisticated and insightful level of inquiry (Lincoln and Guba, 1985, p. 229). The focus establishes the boundaries of the study (what will be studied) as well as inclusion-exclusion criteria (based on the relevancy of new information). From a similar stance, Patton (1990) pointed to the vague nature of inquiry and to real world constraints in stating, "there is no rule of thumb that tells a researcher how to focus a study. The extent to which a research question is broad or narrow depends on purpose, the resources available, the time available and the interests of those involved" (p. 166).

Sampling

Issues surrounding sampling as well as the logic that guide sampling decisions highlight a major difference between qualitative and quantitative methods. The quantitative approach involves representative samples selected randomly to allow for generalization from a population.

The qualitative approach uses small, information-rich samples selected to purposefully focus on issues. For quantitative methods, the same sample is used for the duration of the study. Whereas in qualitative inquiry, samples sometimes change in order to extend, test and fill in information (Lincoln and Guba, 1985, p. 201).

The Human As Instrument for Data Collection

With a malleable design as a guide, the researcher enters the field to begin data collection. The type of data, the role of the researcher in data gathering, as well as the specific methods for collecting data further define the nature of qualitative methods. In general, qualitative data consists primarily of words in the form of interview transcripts, field notes and documents. This data comes from fieldwork in which the investigator spends time in a natural setting gathering data first hand, typically through interviews, observations and document collection. Although these three forms are typically accepted as the primary modes for collection, Lincoln and Guba (1985) specify two other types of data: nonverbal cues, which pertain to nonverbal communications, and unobtrusive information residues. These involve physical traces that can be collected in the absence of the respondents who provided them. In this discussion, both of these are subsumed under the other three categories.

In this type of inquiry the researcher is the primary instrument of data collection. As with sampling issues, this distinction between quantitative and qualitative methods raises concerns within the minds of positivists. Based on paradigm assumptions, Lincoln and Guba (1985) summarize why the human instrument is crucial. In contrast to paper-and-pencil instruments, the qualitative inquirer gathers data him/herself:

> ...because it would be virtually impossible to devise a prior non-human instrument with sufficient adaptability to encompass and adjust to the variety of realities that will be encountered; because of the understanding that all instruments interact with respondents and objects but that only the human instrument is capable of grasping and evaluating the meaning of that differential interaction; because the intrusion of instruments intervenes in the mutual shaping of other elements and that shaping can be appreciated and evaluated only by a human; and because all instruments are value-based and interact with local values but only the human is in a position to identify and take into account (to some extent) those resulting biases (pp. 39-40)

Because the human instrument (1) is responsive, (2) is flexible, (3) sees social organization as holistic entities, (4) relies on tacit knowledge, and (5) sees the unusual, Guba and Lincoln (1981) believe that its strengths outweigh its weaknesses. Although the weaknesses cannot be ignored, they can be abated. People do have selective perceptions, which must be taken into account during observation and interviewing. Individuals can, however, learn how to observe and interview as well as learn how to improve specific skills related to these tasks through education, preparation, and practice (Lincoln and Guba, 1985).

Patton (1990) has argued "to become a skilled observer is a no less rigorous process than the training necessary to become a skilled statistician. People don't 'naturally' know statistics--and people do not 'naturally' know how to do systematic research observations" (p. 201). This parallels Barrick's (1993) assertion that a course on qualitative inquiry be included in preparation of agricultural education researchers. Through education and practice, inquirers can learn how to observe and interview as well as learn what to look for and what to ask.

Methods of Data Collection

The following sections present an overview of the three major methods of data collection--observation, interviews and document collection. In this overview we underscore both the strengths as well as the weaknesses of these methods. It must again be emphasized that by using a combination of data collection tools (e.g., triangulation), the researcher capitalizes on the strengths of each and minimizes weaknesses inherent in a single strategy.

Observation

As a data gathering tool, observation offers both advantages and disadvantages. In terms of advantages, observation (1) provides the context for the study, (2) allows for an inductive approach, (3) gives the researcher direct, first-hand experience with events while they occur, (4) serves as a check against bias, prejudice and selective perceptions, (5) builds on the researcher's knowledge and/or enhances understanding, and (6) allows the inquirer to see the "whole" in a way that members cannot. In terms of disadvantages, observation may (1) alter the setting and the behaviors through the presence of the researcher, (2) not clearly differentiate between objective and subjective information, (3) become very time consuming and produce volumes of data, (4) result in too much involvement by the researcher, (5) not adequately address the researcher's perceptions and biases, and (6) not sufficiently capture the setting because it is impossible to observe everything or have access to everything (Bogdan and Biklen, 1982; Guba and Lincoln, 1981; Patton, 1990).

Interviews

As with observation, interviewing as a method has several strengths. The researcher can (1) move back and forth in time to construct the past, understand the present and predict the future, (2) access the otherwise inaccessible, (3) check observational information, reflections and emerging theories with members of the setting, (4) gather information somewhat systematically, and (5) gain new insights and perceptions. Weaknesses also exist, because information and responses from interviews (1) are highly reflective of the interviewee's perceptions and biases, (2) depend on the respondent's ability to recall, (3) can be affected by the interviewee's physical and emotional state, (4) can be affected by reactions to and interaction with the interviewee, and (5) depend in large part on the interviewing skills of the researcher (Lincoln and Guba, 1985; Patton, 1990).

Documentation

The use of documentation also holds strengths and weaknesses. On the one hand, documents (1) can provide a wealth of information, some of which is not accessible through observation or interviewing, (2) provide highly reliable information if records are legal or official in nature, (3) are easy and cost effective to duplicate, (4) are often readily accessible, (5) confirm information from other sources, (6) provide different perspectives on similar information, and (7) retain the context of the setting. On the other hand, they (1) may be of poor or variable quality (inaccurate, incomplete) and (2) can still reflect perceptions and biases of participants (Bogdan and Biklen, 1982; Guba and Lincoln; 1981; Patton, 1990).

Data Analysis

As with data collection, the procedures for analysis are unique and specific to qualitative methods. Bogdan and Biklen (1982) have suggested "analysis involves working with data, organizing it, breaking it down, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others" (p. 154). The human inquirer serves not only as the instrument of data collection but also as the tool for data analysis. The two remain intertwined because data analysis begins during data collection. The following provides a brief synopsis of strategies used for analysis during and after data collection.

Analysis during Data Collection

Analysis of the data begins during data collection to let "the field worker cycle back and forth between thinking about the existing data and generating strategies for collecting new--often better quality--data" (Miles and Huberman, 1984 p. 49). The inquirer, as if in pursuit of a suspect, seeks out new information, checks leads and tests fledgling hypotheses. The evidence begins to build a preliminary rationale for the emergent theory and the researcher plays both the prosecutor and the defense.

Analysis of Data after Collection

With few rules of thumb, several approaches to analysis exist in practice and are supported by the field. Perhaps the most typical and widely used method is the development of a coding through content analysis — identifying categories or themes based upon patterns and ideas that emerge from the data. The researcher reads through the data looking for primary patterns (e.g., words, phrases, behaviors, thoughts, and events) that are repeated and stand out. After assigning initial labels to these patterns, the researcher begins to apply these labels to the different kinds of data. Through sorting, comparing and contrasting, a system for classification emerges (Patton, 1990). Although these codes remain data specific, Bogdan and Biklen (1982) have suggested the following list of families of codes as examples of some of the coding possibilities: (a) setting/context codes, (b) definitions of the situation codes, (c) perspectives held by subjects, (d) process codes, (e) event codes, (f) strategy codes, (g) relationship and social structure codes, (h) methods codes, and (i) pre-assigned codes.

Following this overview of verification tactics, we discuss the fourth and final topic related to the application of the interpretivist paradigm for agricultural education research.

Assuring the Rigor and Trustworthiness of the Findings

Qualitative researchers strive for rigorous and trustworthy results, however the criteria for assessing these qualities for a qualitative study differ from those used in quantitative studies (Lincoln, 1999). During this phase it is perhaps most critical that consumers of research wear the appropriate lens — an interpretive lens for interpretive studies and a positivist lens for positivist studies. Wearing a positivist lens to assess the rigor of an interpretive study may blind one from seeing its relative merit. Questions pertaining to the concerns of positivists such as: (a) sample size, (b) generalizability and (c) objectivity must be reevaluated through a qualitative lens.

Positivists typically speak of validity, reliability and objectivity when assessing the worth of a study. Based on the underlying assumptions, these concepts do not transfer directly to interpretive inquiry. Some authors retain the terms of validity and reliability while proposing conceptually different means for judging merit (LeCompte and Goetz, 1982; Patton, 1990). Others use different terminology to convey the requisite criteria (Phillips, 1987; Zelditch, 1962). Lincoln and Guba (1985) have offered parallel terms, which may be more applicable. They suggest that interpretivist researchers are concerned with: (a) the credibility (internal validity) of their findings, (b) the transferability or how well their working hypotheses would "fit" in another context (external validity), (c) the dependability (reliability) or testing for consistency by a second evaluator, and (d) the confirmability of the data (objectivity). Although researchers vary in the terms they use, they agree that adequate procedures exist to assure the quality of the research and the findings. The following briefly summarizes some of the strategies, that can assure rigor, worth and trustworthiness in interpretive studies (Borman, LeCompte and Goetz, 1986; Lincoln and Guba, 1985; Miles and Huberman, 1984; Patton, 1990).

Although researchers vary in the terms they use, they agree that adequate procedures exist to assure the quality of the research and the findings. The following briefly discusses some of the strategies that can help assure the rigor, worth, and trustworthiness of interpretive studies (Borman, LeCompte and Goetz, 1986; Eisner, 1981; Lincoln and Guba, 1985; Miles and Huberman, 1984; Patton, 1990). Triangulation involves crosschecking data and interpretations by drawing upon different data sources, methods, and perspectives. Prolonged and repeated observations reduce researcher effect and identify typical as well as atypical characteristics. This goes along with representativeness, in which the researcher strives to investigate the widest range and diversity of events and people possible within the study. Member checks and peer debriefing are two methods that entail asking others if the data are accurate and if the interpretations are plausible. Testing rival explanations and seeking negative cases places the researcher in somewhat of a devil's advocate role, trying in essence to disprove working hypotheses. Intersubjective understanding makes explicit the subjective aspects of interaction with participants. Thick description depicts in detail and depth all elements of the context in a way that allows a reader to then determine the "fit" with another context. A clear description of the design and procedures enables others to reconstruct and corroborate the study.

Finally, Patton (1990) has argued that the issue of credibility centers on three interrelated elements: (1) rigorous techniques and methods, (2) the credibility of the researcher, and (3) the philosophical belief in the interpretive paradigm and qualitative methods. He has suggested that Miles and Huberman emphasize the first and Guba and Lincoln the third, but asserts that all three are critical. As long as myopic lenses cloud the view, interpretive studies will not be seen as credible. Techniques and methods must be clearly described and delineated to enable others to envision the study and judge its worth. Perceptions of the researcher's qualifications and experience lie at the heart of credibility because this individual serves as both the instrument of data collection and the tool for data analysis. This necessitates, then, that qualitative researchers describes their biases, qualifications and experiences to help the reader judge credibility.

Everything Is Not a Nail — Final Remarks

Agricultural education, in general, has been limited by the positivist paradigm in two ways. First, it chips away at the edges by inadequately addressing highly complex, interactive, holistic natures of the settings and issues we study. While the interpretive paradigm strives to investigate the pieces as well as the whole with an emphasis on understanding and interpreting the complex interrelations, it too is perhaps only chipping away, but its product may be more appropriate for understanding agricultural education issues and trends. Secondly, positivism as the dominant research paradigm, has served as a research gatekeeper (Jayaratne and Martin, 2000). Thus, effectively screening out what is perceived to be "sloppy and subjective" methods. Interpretive research is criticized "for not being something it never intended to be, and is not given credit for its strengths" (Borman, LeCompte, and Goetz, 1986, p. 42).

As researchers and teachers, it's our contention that interpretive research has much to offer agricultural education. At the same time we are saddened that the full potential of the discipline has so seldom been realized. Yet we believe that agricultural education is always in the process of evolving. Therefore, it would be a grievous error not to more fully explore an interpretivist paradigm that can contribute to the overall usefulness of agricultural education research. The interpretivist paradigm and its supporting methods provide much promise.

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Expanding the Agricultural Education Research Toolbox: A Case for an Interpretive Perspective

A Critique

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Contribution and Significance of Research

Woods and Trexler have given us cause to reconsider the meaning of scholarship and to consider positivism and interpretivism as suitable tools for scholarly inquiry. They have summarized the work of principal authors with the intent to "inform practice" and to "clarify criteria." Clearly, few would argue with the proposition that qualitative research is a field of inquiry in its own right (Denzin & Lincoln, 1994). At the same time, few would argue that every research paradigm has limitations and delimitations. Woods and Trexler encouraged us to examine our philosophical foundations and have effectively argued that the interpretive paradigm and qualitative methods fit within our contextual settings.

Procedural Considerations

Contrasting views of positivism and interpretivism were provided by the authors. Table 1 is a useful contrast of the two schools that Lincoln and Guba (1985) label as a positivist paradigm and a naturalist paradigm (Table 1.1, p. 37). Woods and Trexler are convincing that the discipline of Agricultural Education is highly complex, interactive, holistic, and that people assign meaning to phenomena based on their view of reality and truth. These axioms undergrid the need for multiple research paradigms. Consequently, the authors are to be commended for the way in which they have examined the question.

Questions for Consideration

As we expand our research toolbox, should we ask the following questions:

Is the fundamental limitation of scholarship in agricultural education the research paradigm that we choose, or is it the significance of the question that we ask? Perhaps the metaphor of selecting the hammer is a second–order decision (hammer–nail). If so, should the first–order decision be one of purpose (design specification–fastener)? What is the nature of problem? Does our evaluand–the thing to be evaluated–have merit and worth? When this first–order decision is confirmed, we should be led to the appropriate research paradigm.

The skill and training necessary to use a particular tool, even a hammer, is well understood. What requisite training is critical for the qualitative researcher?

How can the researcher better develop interpretive perspectives and research strategies?

How can the inquiry give voice to those with whom we propose to understand?

The case for the human as an instrument for data collection is clear. What techniques are useful to transfer this rich understanding to the research consumer and stakeholder?

What are examples of appropriate methods of collecting and analyzing empirical materials that assure rigor, worth, and trustworthiness?

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A Research-Based Process to Improve Science Skills of Teacher Education in Agriculture Program Graduates

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Abstract

Quality teacher education programs must ensure that their graduates have competence in both the content that they plan to teach and supporting content. For secondary agriculture teachers, the range of supporting content is great; however, many teachers believe that what they teach is more relevant to science than other academic subjects (Conroy & Walker, 2000; Johnson, 1996a; Johnson, 1996b). Teacher education in agriculture programs may find it difficult to suggest or require additional science coursework given the already crowded courses of study that must be completed for graduation and certification in most states. In addition, there is no certainty that additional science courses will result in the type of understanding needed by the agriculture teacher in order to provide relevant and meaningful science instruction, and to promote transfer of learning. Application of science principles through technical agriculture coursework and instruction may be a better approach to provide teacher education in agriculture program graduates with maximum instruction and reinforcement of basic science skills. This National Science Foundation study consisted of a series of interviews with representatives of the academic departments in the College of Agriculture and Life Sciences at Cornell University. The intent of the interviews was to engage in discussions with faculty in the various departments about which courses offered in their respective departments would provide maximum instruction and reinforcement of science basic skills, and to solicit their input on other changes that may be needed to the program requirements. Results of the interviews have been used to develop a set of program options, with core courses in four or five areas that vary depending on the option. The resulting options should enable program graduates to not only meet the needs for improved science instruction, but to also be more responsive to emerging industry and workplace needs.

As a process, the interviews and subsequent discussions, as well as the analysis of the results yielded several benefits. First, it will be easier for program graduates to be dual certified in agriculture and one of the sciences beyond general science. This will make them more marketable, particularly in rural areas of the state. Second, we believe the availability of options in food science, environmental science, business/marketing, agriscience, and engineering will increase the likelihood of recruitment of majors in related departments into the certification program. A third and most important benefit of the process has been the development of relationships across campus that were previously not in place. Not only will this improve recruitment, but it can provide additional resources for program implementation in the future.

Introduction and Theoretical Framework

It is as important for teachers to possess subject matter to "teach with" as it is for them to know the subject(s) they will teach. According to the National Council for Accreditation of Teacher Education (NCATE) Standards, a quality teacher education program will ensure that candidates attain both the "academic competence in the content that they plan to teach" and "theoretical and practical knowledge" through studies, courses, and experiences in the liberal arts and sciences (NCATE, 1997, p. 16). The content available in and supportive of the teaching specialty seems to be endless, but there are criteria for selection that relate to the content that is taught in the schools as well as content that will extend and enrich meaning (Cruickshank, 1985). This notion is especially important for agricultural education with the increasing emphasis placed on integration of science and mathematics in the agriculture curriculum (Conroy, 1997); Johnson, 1966a; Johnson, 1996b). Johnson (1996a) and Conroy and Walker (2000) also found that many agriculture teachers do not feel academically prepared to teach science and mathematics skills. The question of how to enhance the preparation of preservice teachers is not one that is easily addressed.

In 1988, the National Research Council recommended several important changes to teacher education in agriculture in order to ensure an "adequate supply of teachers with the broader range of interests and teaching skills that may be needed in future agriculture courses of the type recommended in [its report]" (NRC, 1988, p. 47). Several of the Council's recommendations were related to the content that should be required for certification to teach agriculture:

- Strengthen instruction in science, technology, economics, agribusiness marketing and management, international agriculture, and public policy.
- New methods to teach agribusiness marketing and management, principles of science, public policy, and international agriculture.
- Formal linkages with colleges of agriculture and education to develop new inservice programs and to establish better links with colleagues in other colleges such as experts in science education, etc.

Conroy (1997) found that, while many agriculture teacher preparation programs agreed with the recommendations, few were doing much to incorporate them. A follow-up study conducted in 1998-99 revealed that teacher educators recognized that reforms in the preservice curriculum were needed in order to ensure that program graduates are able to meet the demands of the future (Conroy & Kelsey, 2000). These demands include more science-based instruction in school-based agriculture programs.

Science Education Reforms Relevant to Agricultural Education

Reform activities in science education have focused on Piaget's theories of children's natural development processes and how children structure knowledge. In the constructivist classroom setting, instructional activities generate spontaneous interests that encourage children to structure new knowledge as a natural extension of knowledge they already possess. This contrasts to traditional teaching methods of unloading "adult-organized content" onto children, which can even occur in situations of well-intentioned laboratory exercises or problem-solving activities (Kamii & DeVries, 1993; Sarason, 1993). Central to the ability of teachers to facilitate the "knowledge as construction" science classroom is a deep understanding of the subject matter being addressed (Cohen, 1990). These important changes in science education methodology and their requisite of content understanding cannot be ignored by teacher education in agriculture faculty, particularly when approximately 34% of agriculture teachers, nationwide, stated they teach at least one course for science credit (Dormody, 1993).

According to Tetenbaum and Mulkeen (1986), the foci for improvement of teaching and teachers has been on salaries, career structures, standards, and evaluation, rather than teacher preparation. Even though such noted educational researchers as Boyer (1983), Darling-Hammond (1984), and Goodlad (1984) concluded that teacher education programs were inadequate, their structure and content has remained largely unchanged since World War II (Tetenbaum & Mulkeen, 1986). Specific to teacher education in agriculture, Conroy's 1997 research showed that programs had made few, if any, changes to their requirements during the 10 years following the publication of the National Research Council's recommendations in 1988. Tetenbaum and Mulkeen (1986) also stated that political leaders have chosen to promote routes to alternative certification rather than tackle the problems in teacher education. While proponents of these alternative routes believe they will attract more quality people into teaching, opponents are adamant that this "back door" approach will expose children to persons well prepared in academic specialties, but who lack fundamental understandings of learning theories, teaching methods, or the important interpersonal dimensions unique to teaching (Dunne & Hannah, 1985). The emerging shortage of secondary agriculture teachers makes this problem an important one for the profession to address.

In summary, research on teacher education strongly supports both pedagogical competency and a high level of knowledge in a content area. With the current emphasis on agriscience education, secondary agriculture teachers will need to demonstrate an understanding of the fundamental science and mathematics principles that undergird modern agricultural practices in order for them to teach for understanding in their classrooms. This understanding will require more than a simple facts-based knowledge set (Cohen, 1990; Conroy, 1999). In his book, The Case for Change: Rethinking the Preparation of Educators, Seymour Sarason (1993) contrasted *reforms* in education, which are primarily focused on changes in administrative and teacher behaviors, to *prevention*, which is focused on a notion of cause and effect. In other words, according to Sarason (1993), if you really want to improve education in the long term, you must improve how teachers are prepared.

Statement of the Problem

Prior to this study, preservice students enrolled in Cornell's Teacher Education in Agriculture Program [now the Teacher Education in Agriculture, Mathematics and Science Program (TEAMS)] were required to earn a minimum of 36 semester credits in technical agriculture for certification to teach in New York State. All students completed a core of courses that included a minimum of six credits in each of four areas: Agricultural, Resource and Managerial Economics; Agricultural and Biological Engineering; Plant/Crops/Soil Science; and Animal Science. In addition, students earned a minimum of 12 additional credit hours in a specialty area. Course suggestions for the core were based on a review of the course catalog and the experience of the teacher education faculty, none of whom had taught secondary agriculture in the past 15 years. There was no knowledge of the actual technical agriculture or supporting science content for any of the courses beyond what was listed in the course catalogs. Identifying science content supportive of the teaching of agriculture and ways to better incorporate it into the preservice curriculum could help ensure that graduates are prepared to extend and enrich the meaning of the agriculture content presented to their students.

Purpose and Objectives

This study was part of a larger research project funded by the National Science Foundation to investigate the processes and procedures for integration of the Teacher Education in Agriculture and the Teacher Education in Science and Mathematics programs at Cornell University. The purpose of this portion of the study was to develop and implement a procedure that would enhance the science competencies of graduates of the newly formed TEAMS Program at Cornell. This was accomplished through meeting the following objectives: 1) Determine which courses offered by the College of Agriculture and Life Sciences could provide instruction and/or reinforcement in basic science skills, and 2) Restructure the preservice program core technical agriculture requirements to ensure that students would have maximum exposure to instruction and reinforcement in key supporting mathematics and science content. A third objective was to provide a critique of this process as a model of a research-based process to reform preservice teacher education in agriculture to improve the science skills of graduates.

Methods and Procedures

This study employed both quantitative and qualitative techniques—gathering descriptive information, two focus groups, and individual interviews (Patton, 1990)—and was conducted in three phases. Phase I (Objective 1) involved the development of a list of basic skill taxonomies for science modified from those published by the University of Arizona in 1991. This phase also involved the validation of the taxonomies through use of a focus group of 17 secondary agriculture teachers. They were first asked to rate each skill as "High Need," "Needed," "Low Need," or "Not Needed" to the instruction of agriculture at the secondary level. This activity was followed by a discussion of the taxonomies. The focus group participants were purposefully selected (Gall, Borg & Gall, 1996; Patton, 1990) due to their involvement with the National Council for Agricultural Education's Reinventing Agricultural Education for the Year 2020 project in New York and the development of secondary program standards for agriculture programs in New York. All of them also taught courses for science credit in their respective schools, or were in the process of planning to do so. In addition, a group of seven preservice teachers enrolled at Cornell University completed the rating activity and participated in a follow-up focus group discussion. The extensive list of skills was collapsed into more broad categories, wherever possible, to reduce data but not eliminate any crucial content with resulting information utilized for Phase II.

Phase II (Objective 1) involved interviews conducted during the period April 1 through June 30, 1998, with 15 individuals representing 12 of the 15 academic departments in the College of Agriculture and Life Sciences at Cornell University. Two underlying assumptions guided this phase of the study. First, it was believed that adding more traditional science classes to the TEAMS program requirements (e.g., biochemistry, organic chemistry) would not necessarily provide agriculture teacher education students with the proper instruction and reinforcement of supporting content. Second, it was also believed that, due to their applied nature, the best source for the supporting science content would be courses offered within the academic departments of the College of Agriculture and Life Sciences.

Department Chairs in each department of the College were contacted, provided an overview of the purpose of the project, and asked to recommend individuals who would be most knowledgeable about the content of courses in the respective departments. The recommended individuals were contacted by e-mail, advised of the purpose of the project, and asked for an appointment time for an interview. All but three agreed to participate. The interview protocol consisted of a series of activities lasting approximately 90 minutes. First, interviewees were given an overview of agricultural education in the public schools and the teacher education program at Cornell University. They were then provided with a modified version of the basic skill taxonomies representing broad science knowledge areas and asked to identify courses in their respective departments in which these areas were either taught or reinforced. They were also asked to indicate if it was assumed that students would enter their courses already having mastered certain basic skills. Third, they were provided with a copy of the technical agriculture requirements for certification at the time of the study and asked to comment about any listed courses.

The interviews were concluded with the interviewees' summaries of the courses offered by their departments that would help graduates of the teacher education program attain both agriculture content and enhance their acquisition of supporting science content. All interviews were audiotaped, transcribed, summarized, and analyzed using guidelines for analysis of qualitative interview data (Gall, Borg & Gall, 1996; Seidman, 1991). Interviewees were provided with written summaries of the information they provided and asked to review and comment on its accuracy. Further reliability was ensured through triangulation of the data relative to general comments about the teacher education program and cross-member checks. Phase III (Objective 2) consisted of the development of preservice teacher education in agriculture requirements and options that would meet the needs for enhanced science content based on the survey and interview results. Objective 3 will be addressed throughout the Results, Conclusions, and Implications sections.

Results and Discussion

Of the 488 basic science skills, 89 (18.2%) were rated by participants as "High Need", 259 (53.1%) were rated as being "Needed," 140 (28.7%) were rated as "Low Need," with none being rated as not needed. This summary of the rankings was calculated based on a minimum of 60% of Phase I participants placing a skill in any category. Those skills (348 total) ranked as highly needed or needed as a competence to teach agriculture as a science were considered appropriate for use with interviews with faculty in the academic departments of the College. The 348 skills were collapsed into seven broad categories (e.g., classifies, describes/explains) with content specific sub-categories for discussion purposes.

Academic participants included individuals housed in the following departments: Agricultural, Resource and Managerial Economics (ARME); Agricultural and Biological Engineering (ABEN); Animal Science; Biometrics; Communications; Floriculture; Food Science; Fruit and Vegetable Science; Natural Resources; Plant Breeding; Rural Sociology; and Soils, Crops, and Atmospheric Sciences (SCAS). The results of the interviews are presented in two sections: 1) General Observations, and 2) Observations about Current Program Requirements.

General Observations

Of the 15 persons interviewed, all but two were extremely helpful and interested in what we were trying to do. The two individuals who presented a "challenge" were persons involved in departments heavily focused on laboratory research with little involvement in undergraduate instruction. They also expressed concern that the University was offering what they considered to be "vocational courses in agriculture such as mechanics and floral design." These individuals also raised questions as to why it was so important to "look at process and methods in teacher education and preparation" instead of focusing on technical agriculture content. Of the 15 persons interviewed, only two had worked with individuals in the Education Department and those individuals were also the most knowledgeable about secondary agriculture programming in New York.

Use of the science skill taxonomies presented a challenge for individuals involved in some of the social science areas. The use of the taxonomies also led to some unique observations by individuals in the technical agriculture fields. Aside from the obvious lack of "soft skills" in the list, there were challenges presented by the interpretation of the science terminology, but individuals seemed to enjoy "massaging" the terms to fit within their own paradigm. For example, the two persons interviewed in ARME defined work as "labor, people, and management;" electricity as the "electrical utility industry;" and laboratory instruments as "computers." Individuals in Rural Sociology had a similar problem, but found the exercise to be interesting. The Horticulture faculty member considered a shovel to be a laboratory instrument, diseases were identified as plant diseases, and formulation of solutions was linked to hydroponics. It is important to note awareness of these issues on the part of the teacher education faculty assists in the development of instructional activities focused on how to plan for effective transfer of knowledge and skills (Cohen, 1990; Lee, 1996).

Only one major—Soils, Crops and Atmospheric Sciences—assumed that individuals entered their program with high levels of science knowledge, particularly chemistry. Faculty indicated that chemistry was a prerequisite for all but one course in the department. In a related discussion, most individuals stated that there was a great variation in mathematics competencies among the agriculture students and it was not unusual to have to review and reteach basic math skills in any given course offered within the department/major.

Observations about Current Program Requirements

Several courses required as part of the current core were identified as inappropriate for persons engaged in teaching a skill and/or for their relative science content. The Horticulture course suggested as an option under plant/soil sciences was viewed as too "basic" and not providing the hands-on experiences important for future teachers. The faculty from Animal Science stated that the production- and management-oriented classes recommended in the core were "okay, but not for someone interested in specializing in animal science." He recommended courses in animal biology, nutrition, and genetics to replace those in the current core and stressed the importance of the environment in relation to agriculture, recommending a three-course sequence for agricultural education students. The general consensus was that the production-oriented courses provided the hands-on occupational-type skills, but very little in terms of science instruction. Two individuals in ARME suggested that two courses in the current core should be deleted because of the pre-requisites; they also questioned the relevance of one suggested course for agricultural educators as it is heavily focused on economic theories. The discussions led to an awareness of a unique dilemma. For students who enter the program with little background in traditional agriculture production, how do they acquire the necessary occupational skills while also gaining the necessary science background to effectively design and implement a program of agriscience instruction?

One of the more interesting discussions involved the core requirements for two traditional mechanics courses—woodworking and metal fabrication. The ABEN faculty member's perception of these courses was that they were "taken by students mainly for fun" and lacked rigor and purpose. He did believe that they may be appropriate for a particular type of agriculture teacher in a community in which mechanics was still a needed a viable program offering, but questioned whether that was going to meet the needs of the industry as he sees it. He also suggested that one suggested course be deleted because of its high level of physics. This confusion about the basic purpose of agricultural education permeated the interviews and discussions. What is it (agricultural education)? Does/should it exist in the 21st century strictly to prepare workers for the agriculture industry, or does it—and can it—serve a much more broad purpose in the communities where secondary agriculture programs are housed?

The SCAS faculty member supported the current soils science core requirements, but several of the suggested electives were considered to contain very challenging mathematics. Three additional courses were suggested, all of which have chemistry prerequisites and assume computer literacy. The Plant Breeding faculty member was concerned that students were not required to take a course in plant breeding or genetics, and suggested two course offerings, both of which contain a lot of science instruction. She also suggested an introductory statistics class as necessary to the understanding of relevant research information.

Currently, rural sociology classes are not required in the core, but can substitute for one economics class. The Rural Sociology faculty member suggested several courses that he felt provided reinforcement in basic mathematics, but indicated that courses offered within his department did not address science skills in the "true sense." Several of the interviewees also made suggestions that a business mathematics class would be useful. The current core also does not include natural resources or environmental science classes. The individual from the Natural Resources department suggested a group of core courses that would be critical for an agricultural education student specializing in the environmental sciences. Four courses, in particular, were identified as courses that would provide the maximum instruction and reinforcement in the science basic skills from the taxonomies, with other suggestions to build breadth and depth of both science and the content area. The same process was effective when discussing Food Science courses. Individuals interested in a specialization could take a core of four courses that, like the environmental sciences, would maximize science reinforcement with advanced courses also suggested. All students enrolled in the Food Science major or minor must have chemistry, physics, and other science skills, as well as two semesters of calculus.

The Biometry and Statistics faculty member was interested in the project and had some working knowledge of the teacher education program. She stated she "is not convinced that agricultural education students need higher-level math classes" (beyond algebra and introductory calculus). Several interesting course suggestions came from this discussion, primarily focused on learning calculus in ecological modeling, case study approaches to learning, and statistical thinking. Communications faculty also believed they had some course offerings that are appropriate and should be required for agricultural education majors. These included courses in: writing public information, listening skills, leadership, newswriting, and science writing.

Results of Phase III

The original intended use for the results of the data analysis involved a redesign of the core requirements for technical agriculture for certification. It became clear; however, that the development of one set of core requirements with a multitude of course options might result in enhanced science and skills for program graduates, but might also lead to less depth within the content area. Further analysis of the interview data revealed that many of the faculty believed that the present and future job market would necessitate a move away from the traditional core areas of animal science, plant science, agricultural mechanics, and farm management. They saw the agricultural industry as something much more broad, with employment options in areas as diverse as genetic engineering and journalism. In order to address the depth issue, to provide focus for the program, and to think about meeting future industry needs, a decision was made to reconsider the generic core program beyond just its basic course requirements.

Program concentration options were created based on the information gleaned from the interviews: General Agriculture, Agricultural Science, Agricultural and Biological Engineering, Agricultural Business and Marketing, Environmental Science, and Food Science. Four to five core areas were maintained, depending on the option, but the courses in each area are now based on systems thinking (food processing and marketing are a large part of the agriculture industry in the region) and content needs for the particular concentration. As an example, the Food Science option will require the following course selections as outlined in Table 1. The preservice teacher who selects the Food Science option must also complete an additional 12 credit hours of Food Science coursework; two courses must be in sequence, and six hours must be at the 300-400 level. This contrasts to the information listed in Table 2 for the Agricultural and Biological Engineering option as another example. The ABEN option also requires 12 additional credits of concentration in Agricultural and Biological Engineering with the same requirements for depth.

Table 1.
Core Technical Agriculture Requirements for Food Science Option

Core area	# hours	Areas of emphasis or selection
Agricultural Resource and Managerial Economics (ARME)	3	Marketing
Agricultural and Biological Engineering (ABEN)	3	Science and technology of environmental management
Plant and soil sciences	4	Basic soil science
Animal science	4	Basic animal science
Food science	13-15	Introductory food science Science and technology of food processing Food choices and issues Food processing Product development Sensory evaluation of food Food chemistry

Table 2.
Core Technical Agriculture Requirements for Agricultural and Biological Engineering Option

Core area	# hours	Areas of emphasis or selection
Agricultural Resource/Managerial Economics (ARME)	3	Business management
Agricultural/Biological Engineering (ABEN)	12	Metal fabrication Wood construction Renewable energy systems Hydrology and the environment Aquaculture systems
Plant and soil sciences	4	Basic soil science
Animal science	4	Basic animal science
Agriculture and Natural Resources Management	3	Environmental conservation Natural resources management Demographic analysis Rural areas in metro society Concepts of product development (food science)

Pilot use of these options began in the Fall 1999 semester and will continue with the goal of ongoing discussions with members of the technical agriculture faculty. In addition, it is anticipated that the development of these options will improve our ability to recruit technical agriculture majors into education for the certification program. This is especially important given the impending shortage of qualified secondary agriculture teachers.

Conclusions and Implications

The results of this study cannot be generalized beyond the program under investigation, and it is left to the individual reader to determine if findings are applicable to his/her respective situation (Gall, Borg & Gall, 1996). For our purposes, we anticipate utilizing the new options for certification to teach agriculture as a guide for students in their course selection. We believe that students will have sufficient choices of courses within the options, especially for the 12 credits of specialization beyond the core. This will enable them to custom-design a program that will not only ensure their maximum preparedness to teach and reinforce basic science concepts, but to have a program that fits their needs and interests, as well.

One unintentional, yet desired benefit we believe will result from these changes is the tremendous potential for dual certification in agriculture and one of the sciences (biology, chemistry, physics, or earth science), which is relatively easy for students who are technical agriculture majors and pursuing education/certification as a minor or through electives. Further examination of the interview data reveals important information about the types of science courses required for majors in the various technical agriculture areas. Using the examples from Food Science above, the faculty member interviewed related that all students enrolled in a Food Science major or minor must take biology, chemistry, and physics, as well be competent in basic science (laboratory) skills. They must also take two semesters of college calculus. Just meeting the science requirements for the respective majors will result in students being well on their way to science certification in addition to agriculture.

Both the Food Science and ABEN faculty identified critical thinking and writing as important process skills for students enrolled in their programs who plan to enter industry employment after graduation, but felt they were also very important for agricultural education students enrolled in a teacher preparation program. The ABEN faculty member also had very strong opinions that future agricultural education students—regardless of their majors—should be exposed to the types of critical thinking about the environment in which students in his department frequently engage.

A Critique of the Process

The value of this process is three-fold. First, the goal of developing guidelines for technical agriculture course selection and program requirements that would ensure students have maximum instruction and reinforcement in science skills was accomplished to the extent that is possible within an applied area as diverse as agriculture. At the very least, the new options and course selection guidelines were developed through a knowledge- and research-based process that utilized input from the individuals with the most knowledge of course content within the individual departments. Having the discussions focused on basic skill instruction and reinforcement as opposed to specific occupational skills and content was useful. While it initially proved to be a difficult thing to do it ultimately became easier with practice and helped focus discussions on the more broad industry needs and generic process skills required of teachers. In a sense, the focus of the discussions turned from "teaching agriculture" to "teaching students."

Second, the beginning of discussions between members of the agricultural education faculty and faculty in the academic departments will, we believe, have far-reaching benefits beyond meeting the goals of this study. Nearly all of the individuals interviewed have made subsequent contact with us to inquire about the results of our work, and several have requested follow-up discussions. Brochures and posters highlighting teaching opportunities and the newly designed teaching options have been distributed to all departments in the College. The next step should logically be the development of "minors" or "options" within the technical agriculture majors that would permit further collaboration and joint interactions of faculty and students. The ability to recruit more technical agriculture teachers will not only address the teacher shortage, but will help guarantee that future teachers possess the highest academic capabilities.

Third, while it is only prophetic at this point, we believe the potential to increase the numbers of individuals who are dual certified in both agriculture and one of the sciences (biology, chemistry, physics, or earth science) will help maintain and improve agricultural program offerings in rural areas. According to rural superintendents to whom we have spoken, they find these types of teachers to be very attractive to them. In situations where they cannot justify the employment of a second agriculture teacher, they might be able to hire someone to teach several agriculture courses in addition to working in the science department. The fact that the science certification is in an area of specialization beyond general science will also improve the agriscience instruction and legitimize those courses being offered for science credit in areas where disputes have arisen about the credibility of those courses. This may also serve to improve agriculture program offerings through availability of more in-depth agriscience courses and increase enrollments of higher achieving students in those courses.

Summary and Recommendations for Future Research

The process we undertook to examine our certification program requirements was useful as it led to not only a list of suggested courses which will help our graduates acquire better science knowledge and skills, but also to several other important outcomes. As outlined above, we have begun the process of establishing partners across the College who will assist us in the identification and recruitment of persons who show potential to be secondary agriculture teachers. The process we undertook was time-consuming but has already resulted in positive outcomes for our students, program, and our Department.

We are not certain how useful the science skill taxonomies were to the actual process, although they did, in fact, lead to several interesting discussions. It is recommended that, if this process is replicated, serious attention should be given to the best use, and procedures for use, of the taxonomies… or whether they are necessary to the discussions. In addition, we believe this process would be useful for teacher education programs in other content areas, or for non-certification programs, obviously using different sets of skills taxonomies or their equivalent.

The next step in the research process for us will be the design and implementation of a study to assess the impact of the changes we've made—to both the content and pedagogical requirements of our program. A portion of this study, sponsored by the National Science

Foundation, was begun in 1999, but much remains to be done in regards to assessing how the changes may actually improve science instruction in public school agriculture classrooms.

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A Research-Based Process to Improve Science Skills of Teacher Education in Agriculture Program Graduates

A Critique

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Contribution and Significance of Research

A casual content analysis of newspaper and television news will verify the importance of teacher preparation in the United States. Conroy and Trumbull have boldly ventured into a complex inquiry that has transformational implications for the preparation of teachers of agriculture. Accurate knowledge coupled with new methods and formal relationships shaped the basis of the teacher education design. The assumption that the approach should be anchored in constructivist principles was implicit in the premise.

Procedural Considerations

The authors purport to employ both quantitative and qualitative techniques. The three objectives focused on model building and restructuring the science and mathematics experiences in an agricultural teacher preparation program. The constructivists' research procedures engaged 15 faculty from twelve departments at Cornell University. Two of the 15 faculty acknowledged experience in working with the Education Department. The authors also judged these two faculty were "the most knowledgeable about secondary agriculture programming in New York" (p.5). Perhaps the insights from a group of "outside experts" would also be appropriate in the model building and restructuring process.

Questions for Consideration

How can the confusion about the basic purposes of agricultural education be reconciled?

How did the perceived philosophies of the faculty group influence the curriculum? Using an interpretive perspective, how do you reconcile value and worth among differing philosophies?

Given the purpose of the inquiry, what were the areas of consensus among the 17 secondary agriculture teachers and the twelve faculty?

Is 36 hours of technical agriculture adequate to develop a thorough understanding of science, mathematics, and agricultural science, given a bachelor's degree of 136 hours?

What methods will be used to assess the effect of the curriculum change on science instruction?

Should production tasks or science principles be used to create the curriculum framework? How does the constructivists design fit in the new framework?

What are the job opportunities and career implications for secondary agriculture teachers who select focused options, such as food science, as minors?

Educational Needs of Beginning Farmers in Iowa as Perceived By Providers of Agricultural Education

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Abstract

The main purpose of this study was to identify the educational needs of beginning farmers in Iowa as perceived by providers of agricultural education and to draw implications for planning future agricultural education programs. High school agricultural education instructors, non-land grant college agricultural instructors, Extension directors and specialists, NRCS county conservationists and agribusiness professionals were surveyed.

The ag teachers were somewhat younger on average than any of the other provider groups and had correspondingly less experience; moreover, experience as an ag teacher may tend to lead toward some of the other professions. The providers reported spending different amounts of time with beginning farmers. It appeared that beginning farmer education is not a specific priority but is incidental to the primary objectives for many of the providers.

The respondents differed appreciably in their estimate of the future usefulness of educational providers but matched more closely in rating media alternatives. All of them placed the Internet high on the scale but gave low ratings to audio tapes and newspaper. They agreed that beginning farmer education should be taught using a variety of instructional methods, use input from farmers when developing programs, emphasize problem solving situations which involve primarily mental activity, emphasize production agriculture skill development and that beginning farmers need to consult a variety of information sources to make competent farming decisions. All three of the topics rated most important were in the business area, but several production skills were also rated highly.

The providers reported using different educational delivery methods to present selected topics to beginning farmers. Ag teachers and college teachers consistently used meetings or classes most frequently, one-on-one less frequently, and mass media much less frequently. The other provider group reported a different pattern of delivery, consistently using one-on-one instruction much more frequently than the teachers. Extension reported using the three methods in a more generally balanced manner.

Introduction

As we enter the twenty-first century, researchers point with concern to the general aging of the farmers in America. In 1996, Lasley reported that approximately 16,000 new farmers would be needed in Iowa alone. The problem is compounded by the general increase of risk currently perceived by farmers. The 1999 Iowa Farm and Rural Life Poll Summary Report (Lasley, 1999) showed that 89 percent of Iowa farmers reported that risk levels had increased in the past five years.

To counter that risk, farmers are seeking better access to farm management information. This need is particularly vital to beginning farmers. With the proliferation of computers and other media, farmers have a plethora of information available. Questions have been raised regarding where they can get unbiased information, which information is most important, and how to access and understand that information. In a study of beginning farmers in Iowa, Trede and Whitaker (1998) identified five general groups which provide agricultural education including Cooperative Extension, high school agricultural educators, post-secondary schools, governmental agencies, and agricultural businesses.

In 1914 the Smith-Lever Act provided federal funding to establish the Cooperative Extension system. Agricultural education was initiated in public schools three years later with the passage of the Smith-Hughes Act. In 1965, the Iowa Area Vocational Education Act allowed funding provided by the federal government to bolster post-secondary agricultural education throughout the state at many community colleges (Sleight, 1978).

Since its creation, the Soil Conservation Service (SCS) has utilized demonstration projects and one-on-one visits to educate farmers regarding conservation practices (Helms, 1992). The SCS was renamed the Natural Resource Conservation Service (NRCS) in the Department of Agriculture Reorganization Act of 1994 as part of the continuing federal commitment to resource conservation efforts (Helms, 1998). Legislation over the decades has also broadened their responsibility substantially. The 1996 Farm Bill specifically directed the NRCS to provide technical and educational assistance relating to conservation to landowners dealing with range management, wildlife, forestry, and especially watershed protection in conjunction with other USDA agencies (NRCS, 1996).

It has become increasingly important for farmers to understand the proper applications, limitations and management of farm inputs and equipment which have become more sophisticated and specific. Many farmers have come to rely upon suppliers to provide educational material and information. Bazik and Feltes (1999) found that 70.7 percent of the farmers they surveyed rely on information from chemical, seed and feed dealers in making management decisions.

In this environment, agricultural educators are continually working to develop effective educational programs for beginning farmers. Research strongly supports focusing adult education upon practical applications and problems relevant to participants (Fell, 1999) and has shown that learner participation in developing the curriculum enhances adoption of ideas and practices presented (King, 1999). In 1998, Trede and Whitaker reported a study which examined educational needs and preferences of beginning farmers in Iowa as perceived by beginning farmers, but further study was needed to identify the current perceptions and offerings of educational providers. This study was funded by the Iowa State University Experiment Station as part of a larger research project emphasizes needs assessment, program delivery, on-site education, and the development of new models for the delivery of beginning farmer education.

Purpose and Objectives

The purpose of this study was to identify the educational needs of beginning farmers in Iowa as perceived by providers of agricultural education. The specific objectives of the study included the following.

1. Identify common characteristics of and differences between providers of agricultural education in Iowa.
2. Identify and compare the perceptions of providers regarding the
    a. usefulness of selected agricultural information providers and media which have been identified and rated by beginning farmers,
    b. delivery of agricultural education to beginning farmers in Iowa, and
    c. current and future importance of selected agricultural topics which have been rated for importance by beginning farmers.
3. Identify what is currently being offered by providers and how it is being presented.

Methods and Procedures

For the purpose of this study, "educational providers" was defined the same as in Whitaker's (1998) study: those institutions and organizations that are actively involved in providing educational programs to beginning farmers. The providers surveyed were those rated by the beginning farmers in Whitaker's study. Data were collected by self-administered questionnaires mailed to 527 providers of agricultural education in Iowa and presented to 167 high school agricultural education instructors (Ag Teachers) attending the 1999 summer conference in Ames. The mailing included the agricultural instructors (college teachers) at each of the colleges in Iowa except Iowa State University (ISU), ISU Extension Directors for each county and the Extension specialists with agricultural assignments (Extension), the NRCS County Conservationists (Conservationists) in Iowa, and 144 individuals involved in agribusiness (Ag Business).

The survey instrument included sections adapted from the instrument used by Trede and Whitaker (1998) dealing with the current and future usefulness to beginning farmers of educational providers and media, the perceptions of providers regarding the delivery of beginning farmer education and of the current and future usefulness of selected agricultural topics. The response for each item in these sections used a Likert-type scale with five response categories ranging from 1 as not useful, strongly disagree or extremely unimportant to 5 being extremely useful, strongly agree or extremely important. It was established a priori that ratings of 4 or above would indicate a perceived tendency to be useful, in agreement with, or important in the future.

The instrument also included sections dealing with the topics on which providers currently offer education and ranking which of three general presentation methods is used most frequently for each, as well as a section for demographic and background information. In the section dealing with current offerings respondents were first asked to indicate if they offered activities dealing with selected topics. For each of the topic areas in which they provided activities, they were asked how frequently they used each of three presentation methods using a scale ranging from never or seldom used (1) to most frequently used (4). The instrument was reviewed prior to use by experts at ISU who had experience with beginning farmer education and was found to have content and face validity.

The data were tabulated using SPSS for Windows 9.0. Across the entire group, a total of 456 useable surveys were returned for a return rate of 66 percent. Non-response error was controlled by comparing early and late respondents (Miller & Smith, 1983). No significant differences were found between early and late respondents in any of the groups.

Findings

The providers surveyed were similar demographically, but differences in age and experience were identified. Their ratings of the usefulness of providers differed as did their agreement with statements related to beginning farmer education. The groups showed more similarity in their rating of the usefulness of media and the importance of selected topics to beginning farmers.

Since census surveys were done with the college teachers, Extension and conservationists, the data collected for those groups can be used with confidence. In the case of the high school instructors, the data should only be considered representative of those who attended the 1999 summer conference. While approximately 74% of the high school agriculture teachers in Iowa were present, those who did not attend may have different opinions than those who attended.

The agribusiness group surveyed for this study included professionals in farm organizations and businesses registered with the Iowa Department of Agriculture and other professional agribusiness organizations known to exist in Iowa. Although the group included people involved in a diversity of agribusiness activity, caution must be used when interpreting the data since those surveyed may not be representative beyond the group.

A total of 456 usable surveys returned including 92 from high school ag teachers, 34 from community college instructors, 152 from Extension, and 178 from other providers of agricultural education. Of the ag teachers, 85% were male, 82% had a bachelor degree and 17% had a masters degree, all had an agricultural major in college, 92% were raised on a farm, and 65% had farming experience as an adult. Of the college teachers, 94% were male, 42% had a bachelor degree, 49% had a masters degree, and 6% had a doctoral degree. 94% majored in an agricultural major in college and 6% in another life science, 88% were raised on a farm and 91% had adult farming experience. Of the Extension group, 76% were male, 9% had a bachelor degree, 67% had a masters degree, and 24% had a doctoral degree. 67% had an agricultural major in college while 14% majored in another life science, and 19% had a non-life science major, 82% were raised on a farm and 62% had adult farming experience. Of other providers, 85% were male, 49% had bachelor degrees, 36% had a masters degree, and 12% had a doctoral degree. 73% had an agricultural major, 8% majored in another life science and 14% in another discipline, 82% were raised on a farm and 65% had adult farming experience.

The ag teachers averaged 36.9 years of age, 12.5 years of experience in their current occupation, and 13.9 years of experience in an agricultural profession. This compared to the college teachers, Extension and other providers average ages of 45.4, 48.6 and 45.5 years, with17.5, 15.1 and 16.0 years of experience in their current occupations, and 24.3, 18.7 and 20.8 years of total experience in agriculture respectively. Of the ag teachers surveyed, 74.4% had no experience in any other field. Conversely, 91.2% of the college teachers and 82.9% of the other providers had experience in one or more of the other professional areas. 58% of the college teachers had prior experience teaching at the secondary level as did 32 % of the Extension field staff.

Of the ag teachers, only 39.9% indicated that they spent time with beginning farmers. That compared to 90 % of the college teachers, 91% of Extension, and 78% of the other providers. Among those educational providers who indicated spending time with beginning farmers, ag teachers spent 8.4%, college teachers 38.4%, Extension 10.4%, and other providers spent 5.7% of their time.

The future usefulness rankings for each of the groups are shown in Table 1. All of the groups rated one or more information source as useful, but they differed appreciably in their ratings. The ag teachers rated Cooperative Extension and Community Colleges as most useful in the future to beginning farmers followed by high school ag programs, agribusiness firms and ISU courses. College teachers rated Community Colleges as most useful followed by ISU courses, Ag Consultants, Agribusiness Firms and Cooperative Extension. Extension rated Cooperative Extension most useful followed by Parents, Siblings & Relatives and ISU courses. Other providers rated Community Colleges and Parents, Siblings & Relatives highest, followed closely by Cooperative Extension.

The providers' ratings of the usefulness of media alternatives matched more closely. All of the providers gave a very high rating to the Internet - World Wide Web; none of the other media were rated above 4. The second highest rating from all groups was Farm Publications. The lowest rated media by all of the providers were Audio tapes and Newspaper.

As shown in Table 2, the providers agreed that beginning farmer education should be taught using a variety of instructional methods, use input from farmers when developing programs, emphasize problem solving situations which involve primarily mental activity, and emphasize production agriculture skill development. All of the groups showed the least agreement with statements that beginning farmer education should emphasize distance education and be taught using primarily non-formal rather than formal educational methods. The groups differed regarding the other statements. The other provider group agreed that beginning farmer education should emphasize the adoption of ag technology but did not agree that beginning farmer education should emphasize learning by experience in agriculture, individualized instruction, or problem solving situations which involve primarily physical activity. Ag teachers and college teachers agreed with all four of those statements whereas Extension agreed with none of them.

As shown in Table 3, all of the providers indicated strong agreement with the statement that beginning farmers need to consult a variety of information sources to make competent farming decisions. Only the college teachers agreed that, to keep up to date, farmers should participate in educational programs on a year-round basis. None of the other statements

Table 1. Ratings of future usefulness for providers and media [a]

	Ag Teachers		College Teachers		Extension		Other Providers	
Providers	mean	SD	mean	SD	mean	SD	mean	SD
Community colleges	4.21	.80	4.44	.76	3.55	.95	4.03	.91
Cooperative Extension	4.21	.82	3.75	.98	4.12	.66	3.95	.91
High school ag programs	4.08	.84	3.44	.88	3.40	1.04	3.69	1.05
Agribusiness firms	4.07	.73	3.78	1.13	3.45	1.08	3.57	.95
ISU courses	4.04	.79	3.88	.87	3.76	.84	4.12	.83
Commodity organizations	3.95	.64	3.47	1.02	3.13	1.06	3.30	.95
Farm organizations	3.87	.82	3.28	1.08	3.11	1.01	3.32	.93
Parents, siblings & relatives	3.78	.93	3.58	1.12	3.92	.93	4.02	.99
Government agencies	3.78	.84	3.28	1.20	2.95	.99	3.29	1.14
Agricultural consultants	3.82	.82	3.88	.91	3.33	1.07	3.78	1.02
Media								
Internet - World Wide Web	4.34	.70	4.50	.62	4.13	.90	4.08	.87
Farm publications	4.24	.67	3.81	1.12	3.88	.74	3.88	.83
Information services)	4.04	.84	3.90	1.04	3.65	.96	3.72	.93
Television or satellite dish	3.91	.89	3.71	.94	3.20	1.13	3.43	.98
Marketing Services	3.87	.73	3.75	.98	3.51	.93	3.55	.99
Radio	3.86	.81	3.19	1.26	3.23	1.05	3.35	1.01
Fiber optics network (ICN)	3.85	.92	3.81	.93	3.45	1.02	3.62	1.02
Extension pamphlets	3.73	.89	3.58	.96	3.79	.78	3.53	.95
Video tapes	3.66	.88	3.41	.98	3.01	1.06	3.03	1.05
Newspaper	3.65	.90	2.97	1.26	2.66	.99	2.91	1.09
Audio tapes	2.81	.99	2.94	1.13	2.40	.95	2.63	1.01

[a] scale: 1=not useful, 2=limited usefulness, 3=no opinion, 4=useful, 5=extremely useful

Table 2. Level of agreement with statements about beginning farmer education [a]

Beginning farmer education should:	Ag Teachers		College Teachers		Extension		Other Providers	
	mean	SD	mean	SD	mean	SD	mean	SD
be taught using a variety of instructional methods	4.38	.76	4.66	.48	4.59	.59	4.25	.59
emphasize the adoption of ag technology	4.37	.69	4.34	.83	3.86	.92	4.05	.81
use input from farmers when developing programs	4.34	.66	4.72	.46	4.60	.56	4.36	.63
emphasize problem solving situations which involve primarily mental activity	4.26	.76	4.69	.54	4.31	.77	4.22	.76
emphasize learning by experience in agriculture	4.20	.65	4.31	.97	3.88	.91	3.90	.92
emphasize individualized instruction (site visits, etc.)	4.15	.79	4.38	.71	3.85	.82	3.93	.79
emphasize problem solving situations which involve primarily physical activity	4.14	.64	4.34	.70	3.90	.88	3.59	.94
emphasize leadership development in agriculture	4.12	.80	4.22	.71	3.87	.88	3.88	.84
emphasize production agriculture skill development	4.01	.84	4.16	.95	4.06	.89	4.03	.75
be taught primarily using non-formal rather than formal educational methods	3.71	.85	3.87	.81	3.54	1.00	3.20	1.08
emphasize distance education as a means of delivery	3.57	.78	3.50	1.02	3.53	.99	3.18	.95

[a] scale: 1=strongly disagree, 2=disagree, 3=no opinion, 4=agree, 5=strongly agree

about beginning farmer education delivery received ratings of 4 or higher. The providers gave low ratings to statements that beginning farmers should consult primarily with public institutions for unbiased information, are willing to travel up to one hour to attend educational activities, and are willing to pay tuition and fees to attend beginning farmer educational activities.

Table 3. Level of agreement with statements about beginning farmer education delivery [a]

Delivery of beginning farmer education:	Ag Teachers		College Teachers		Extension		Other Providers	
	mean	SD	mean	SD	mean	SD	mean	SD
Beginning farmers need to consult a variety of information sources to make competent farming decisions	4.40	.66	4.53	.57	4.40	.75	4.30	.64
Single meetings on specific topics should be emphasized	3.96	.69	3.97	.86	3.39	.96	3.70	.83
To keep up to date, farmers should participate in educational programs on a year-round basis	3.90	.86	4.44	.83	3.99	.89	3.67	.92
On site educational instruction (face-to-face) is preferred by farmers	3.88	.74	3.81	1.06	3.81	.83	3.85	.80
If it would reduce their travel, farmers would prefer to attend activities delivered by fiber optic, satellite, etc.	3.69	.85	3.84	.88	3.51	.94	3.61	.96
Series of meetings or workshops with in-depth analysis of a topic should be emphasized	3.67	.87	3.91	.93	3.61	.92	3.68	.83
Beginning farmers should consult primarily with public institutions for unbiased information	3.42	.99	3.56	1.11	3.52	1.02	3.06	1.06
Beginning farmers are willing to travel up to one hour to attend educational activities	3.16	.91	3.59	.95	3.38	.96	3.52	.85
Beginning farmers are willing to pay tuition and fees to attend beginning farmer educational activities	2.87	.93	3.16	1.08	3.05	.94	3.16	.93

[a] scale: 1=strongly disagree, 2=disagree, 3=no opinion, 4=agree, 5=strongly agree

The provider ratings of the current and future importance of selected agricultural education topics are shown in Table 4. All of the providers assigned the highest level of future importance to the same three topics, farm markets, marketing strategies and pricing, financial management, records, budgets and analysis, and whole farm planning, long-term decision making, and strategic planning.

Table 4. Mean current and future importance of agricultural topics and subject matter [a]

subject area	Ag Teachers		College Teachers		Extension		Other Providers	
	current	future	current	future	current	future	current	future
Farm markets, marketing strategies & pricing	4.58	4.60	4.84	4.84	4.68	4.76	4.67	4.70
Financial mgmt, records, budgets and analysis	4.55	4.59	4.78	4.84	4.70	4.79	4.63	4.76
Farm planning, decision making, strategic planning	4.40	4.48	4.53	4.63	4.51	4.67	4.25	4.50
Technology transfer, computers, GPS, etc	4.24	4.44	4.53	4.63	3.94	4.30	3.83	4.23
Crop production, mgmt, & technology	4.16	4.09	4.34	4.34	4.27	4.18	4.40	4.37
Livestock production, technology & mgmt	4.09	4.02	4.13	4.16	4.09	4.05	4.19	4.12
Resource conservation & sustainability	3.92	4.13	4.16	4.28	3.90	4.17	3.93	4.12
Multi & inter-generational farming & estate planning	3.89	4.19	4.06	4.22	3.83	3.96	3.54	3.85
Machine selection, sizing, acquisition, maintenance	3.65	3.68	4.13	4.03	3.58	3.49	3.76	3.74
Facility selection, sizing, acquisition, maintenance	3.57	3.59	3.97	3.88	3.52	3.46	3.52	3.61

[a] scale: 1=extremely unimportant, 2=unimportant, 3=no opinion, 4=important, 5=extremely important

The lowest ranked topic and only topic which did not receive a rating of 4 or above from any of the providers was building & facility selection, sizing, acquisition, maintenance and repair.

Table 5 summarizes how frequently the providers used three different educational delivery methods to present selected topics to beginning farmers. Ag teachers and college teachers consistently used meetings or classes most frequently, one-on-one less frequently, and mass media much less frequently. The other provider group reported a somewhat different pattern of delivery, consistently using one-on-one instruction much more frequently than either of the other two delivery methods. They used meetings more frequently than mass media, but both were used much less frequently than one-on-one instruction. Extension reported using a more balanced approach, using meetings and one-on-one delivery slightly more on individual topics, but using mass media approaches only slightly less often to deliver information about crop and livestock production. In the other eight topic areas, Extension also reported using mass media less than the other two methods of delivery.

Table 5. Frequency of use of three methods of delivery for selected agricultural topics [a]

subject area	Ag Teachers			College Teachers			Extension			Other Providers		
	media	1:1	class	media	1:1	class	media	1:1	class	media	1:1	class
Crop production practices, technology and management	1.59	2.17	2.41	1.50	2.40	3.60	2.44	2.84	2.93	1.60	3.41	2.01
Livestock production practices, technology and management	1.73	2.31	2.38	1.80	2.30	3.50	2.34	2.88	2.78	1.60	3.15	2.03
Farm markets, marketing strategies and pricing	1.85	2.00	2.46	1.53	2.29	3.35	1.93	2.47	2.66	1.41	2.69	1.82
Financial management, records, budgets and analysis	1.42	2.37	2.47	1.70	2.30	3.50	1.90	2.89	2.50	1.23	3.21	1.67
Machinery & equipment selection, sizing, acquisition, maintenance	1.50	1.88	2.00	1.65	2.06	3.12	1.59	2.38	1.69	1.23	3.00	1.60
Building & facilities selection, sizing, acquisition, maintenance	1.13	2.00	2.38	1.88	2.00	3.00	1.61	2.85	1.83	1.36	2.79	1.46
Whole farm planning, long-term decision making, strategic plan	1.50	1.92	2.67	1.60	2.07	3.27	1.69	2.72	2.43	1.49	3.45	1.83
Resource conservation and sustainability	1.74	2.53	2.26	1.53	2.27	2.93	2.12	2.57	2.57	1.90	3.56	2.08
Multi & inter-generational farming & estate planning	1.27	1.82	2.73	1.82	2.45	2.82	1.95	2.40	2.24	1.14	3.07	1.64
Technology, computers, GPS, etc.	1.64	2.45	2.50	1.65	2.13	3.48	1.76	2.54	2.63	1.37	3.14	1.70

[a] scale: 1=never or seldom used, 2=occasionally used, 3=somewhat frequent use, 4=most frequently used

Conclusions, Implications and Recommendations

The ag teachers are somewhat younger on average than any of the other provider groups and had correspondingly less experience. It also appears that experience as an ag teacher may tend to lead toward the other professions more strongly than the other way around since only 25.6% of the ag teachers surveyed had no experience in any other field while 91.2% of the college teachers and 82.9% of the other providers had experience in one or more of the other professional areas. This should be considered when deciding what to include in teacher education programs.

The groups of providers reported spending different amounts of time with beginning farmers. There is an implication that, for many of the providers, beginning farmer education is not a specific priority but is incidental to their primary objectives. If they are asked to contribute to future programs, their participation should be matched to the objectives of their individual organizations and appropriate incentives should be made available.

Both Extension and the other provider group appear to regard the input of parents, siblings and relatives more highly than do the ag teachers and college teachers, but all of the providers rated the need for input from farmers themselves very highly. This supports the involvement of user advisory committees in future program development and suggests involving relatives along with beginning farmers.

The providers rated the use of the Internet to deliver information very highly. By contrast, the use of distance education, satellite or ICN delivery was not preferred. The low rating of distance education is similar to findings by Miller in 1997. It may be that his observation that teachers were at the early stages of the adoption process applies to other providers as well. A review of the raw data showed that individual responses for most of the distance education related questions ranged from extremely low to the extremely high. Further research is needed in this area.

The most highly rated topics were in the business side of farming but several of the production skill topics were also highly rated. The business topics were also rated highly by beginning farmers (Whitaker, 1998). Program development should reflect these priorities and utilize problems meaningful to beginning farmers under the prevailing market conditions.

The providers reported using different educational delivery methods to present selected topics to beginning farmers. Ag teachers and college teachers consistently used meetings or classes most frequently, one-on-one less frequently, and mass media much less frequently. The other provider group reported using a different pattern of delivery, consistently using one-on-one instruction much more frequently than the teachers. Extension reported using all three methods for different topic areas in a more balanced approach. Much of this difference may be inherent to the nature of the organizations represented. Ag and college teachers have been traditionally employed primarily to teach classes and have been expected to give instruction in a relatively structured manner. Agribusiness has traditionally operated at the opposite extreme, primarily dealing with customers on an individual rather than group basis. Extension has traditionally bridged the span between the classroom and the farm, providing both group and individual instruction.

As educators and decision-makers work to improve the effectiveness of educational programs for beginning farmers, it will be essential to encourage and utilize input from the farmers involved. Each of the providers have resources and expertise to contribute to the effort, but they also have preferences regarding their involvement and needs which must be considered. The providers rate each other highly and appear to agree more frequently than they differ on educational priorities. Further research is needed to clarify differences of opinion within the provider groups and how they can most efficiently cooperate to deliver agricultural education, but this study and the others referenced should provide a sound basis upon which future programs can be developed.

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Educational Needs of Beginning Farmers in Iowa as Perceived By Providers of Agricultural Education

A Critique

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The authors provide a good discussion of the rationale for a variety of providers to become involved in the education of beginning farmers. The general aging of farmers in America, the financial risks associated with farming and the speed of technological change are all factors that make continuing educational opportunities a necessity for those individuals involved in production agriculture. For beginning farmers, lack of capital and management experience also contribute to their needs.

The purpose of this study was to identify the educational needs of beginning farmers in Iowa as perceived by providers of agricultural education. The authors utilized a self-administered questionnaire to assess the characteristics and differences among providers of agricultural education, providers perceptions of the usefulness of selected agricultural information providers and media, delivery of agricultural education to beginning farmers, current and future importance of selected agricultural topics for agricultural for beginning farmers, and what is currently being offered by providers and how it is being presented.

The authors indicated that a census survey was completed with community college teachers, extension and conservationists and data from those three groups could be utilized with confidence but that data from high school agriculture instructions were only representative of those who attended the 1999 summer conference. The authors indicate that the groups were those identified in a study conducted by Whitaker. More information concerning how these four groups were picked from the study would have been helpful to this reader. While a total response rate was provided, individual group response rates would have been helpful. Why were no attempts made to obtain survey information from teachers not attending summer conference. It would also have been helpful to know the total numbers in the population of each group surveyed. The authors only indicate the number returned in each group. These issues raise questions concerning the selection of the population for the study and in tern, the validity of the results and conclusions.

After reading the results and conclusions sections of this study, this reader is forced to ask "So What?" The four groups identified have different missions and historical ways of working with beginning farmers. It is therefore not great leap of faith to predict that they would differ in their ratings of the usefulness of various providers of agricultural education. Any trained provider of adult education would also know that a variety of methods should be used, instruction should be problem based and input from the participants in critical when developing the education programs to be delivered. In light of the current economic conditions of agriculture, it is also predictable that all of the providers would identify needs in marketing, pricing strategies, financial management, records, budgets and analysis, whole farm planning, long-term decision making, and strategic planning as important topics for future educational programs. In light of their different operational styles, it is also not surprising that they differed regarding their perceptions of the use of media, one on one, and classes as appropriate delivery methods for beginning farmers.

Assessing the Learning Styles of Iowa Farmers

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Abstract

Learning styles have been studied for many years; however, studies focusing on learning styles of farmers are very limited. Knowledge of learning styles is important and may be useful in the development and conduct of adult education programs.

The purpose of this study was to establish baseline information regarding the distribution of learning styles among Iowa farmers. A secondary purpose was to establish for these same individuals their stated preferred learning mode for selected agricultural topics.

A purposive sample (judgment sampling) was developed with assistance from the Iowa Farm Bureau Federation. A self-administered mail survey was distributed to 1100 members on county leadership committees. Three hundred and sixty four (33.1%) were returned and 289 (26.3%) were useable. Content validity was ensured by a panel of experts. A reliability analysis was completed on the useable responses for sections B and C of the survey instrument with the result of a Cronbach Alpha of .84 for each section.

The learning style for each respondent was determined using the Kolb Learning Style Inventory (LSI). The Kolb LSI consists of 12 open-ended statements with four choices available to complete the statement. Each choice corresponds to one of four learning modes which are combined to determine an individual's learning style.

The preferred learning style for the respondents was the Assimilator (49.1%). Other learning styles were: Accommodator (14.6%), Diverger (14.9%), and Converger (21.4%). Individuals with the Assimilator learning style prefer to grasp knowledge through abstract conceptualization (logic and analysis) and transform it by reflective observation (learning by watching others).

The results of the study showed that active experimentation (learning by doing) seemed to be the preferred learning mode for agricultural topics related to physical farming resources (land, crops, livestock, machinery, and buildings) while abstract learning by observing others) were the preferred learning modes for more critical thinking activities such as markets and prices, whole farm planning, and financial management.

The farmers were also asked to rate the effectiveness of 26 different learning activities. Rating high were the use of consultants or specialists, attending field days, tours, and demonstrations, attending a single or series of meetings on a specific topic, and studying and analyzing a problem on my own. The farmers rated university and community college credit classes, watching a television program, audio tapes, and reading a newspaper much lower in terms of their effectiveness.

Although the results of this study may not be generalized to the entire population of Iowa farmers, the results can still provide valuable information to educational providers as they plan and deliver education to Iowa farmers.

Introduction/Theoretical Framework

Learning styles have been studied for many years by researchers; however, studies focusing on the learning styles of farmers are very limited. For many agricultural adult education programs, the content is planned, developed, and delivered without regard to the learning style of the farmer (adult learner). Increasing the awareness of differences in learning styles of farmers by adult education providers, (extension services, community colleges, and commercial entities, and others) can enhance learning.

Apps states, "Life-long learning goes well beyond the workplace...Lifelong learning also includes consideration of global issues such as social, economic, and environmental problems" (Apps, 1991, p.2). Since information is doubling every four to five years, educational providers, according to Apps (1991), need to help adult learners make sense out of what information they currently have available before providing them more.

Today's farming environment is highly competitive and typically provides narrow profit margins. Production technology has become very technical with the advent of biotechnology, global positioning, computers, and satellite communications. To make competent management decisions, farmers must be able to acquire, interpret, and evaluate trusted and credible knowledge in an efficient, effective, and convenient manner (USDA, Commission of Small Farms, 1998).

Knowledge of learning styles is important to educational providers. According to Kolb (1984), learning is conceived as a holistic adaptive process, providing conceptual bridges across life's situations. Drawing upon the experiential learning work of Dewey (1938), the active learning work of Lewin (1951), and Piaget (1952) who described intelligence as primarily the result of interaction between a person and the environment, Kolb described learning as a four step life-long continuous process. As adult learners, people become more skilled in grasping and transferring experiences and rely more on a particular style of learning.

Past research has demonstrated that learning style preferences by students and the consideration that teachers give to those learning styles has been closely related to student learner achievement, dropout rates, and student satisfaction (Rollins & Scanlon, 1991; Rollins, 1990; Cox, Sproles & Sproles, 1988; Price, 1983). While this research has not involved adults, the usefulness of learning styles in postsecondary and nonformal adult education has been demonstrated (Smith, 1982). Pigg, Busch, and Lacy (1980) concluded that using a learning style inventory may be useful in the development and conduct of adult education programs.

Claxton and Murrell (1987) concluded that information about learning style can help the teacher to become more sensitive to differences students bring to the classroom. Also, depending upon a teacher's purpose, understanding learning styles can serve as a guide in designing learning experiences to match the learning style.

Kolb's (1984) experiential learning theory was used as a basis for the learning styles assessed in this study. Kolb described learning as a cycle consisting of four modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). The order in which the modes occur within the cycle and the importance of each mode depends upon the individual's learning style.

Kolb then further describes four specific learning styles by combining the AC-CE and AE-RO scores from a 12-question Learning Style Inventory. The four learning styles identified by Kolb are: accommodator, diverger, converger, and assimilator. Assimilators, as defined by

Kolb, are persons who benefit little from unstructured "discovery" learning such as exercises and simulations. They tend to be more interested in abstract ideas and concepts and are best at inductive reasoning and theory construction. They rely most heavily on abstract conceptualization(AC) and reflective observation(RO). Convergers tend to focus on solving problems and making decisions based on finding solutions to questions. They like to follow abstract conceptualization(AC) with active experimentation(AE). According to Kolb, divergers tend to approach a situation by observing rather than taking action while accomodators are persons who learn primarily from "hands-on" experience. Divergers combine concrete experience(CE) with reflective observation(RO) to learn. Accomodators tend to act on instinct rather than logic and rely heavily on people for information rather than their own technical analysis. Their learning style relies greatly upon concrete experience(CE) and active experimentation(AE). Accomodators prefer "hands-on" experience and often rely more on "feelings" rather than "logical analysis" when solving problems.

Purpose/Objectives

The purpose of this study was to establish baseline information regarding the distribution of learning styles among Iowa farmers. A secondary purpose was to establish for these same individuals their stated preferred learning mode for selected agricultural topics regarded as important to today's farming industry. The specific objectives of the study were:

1. To determine the learning style of the Iowa farmers participating in this study using the Kolb Learning Style Inventory and to examine the distribution of these styles among the respondents.
2. To determine the preferred learning mode of the respondents for selected agricultural topics.
3. To determine the perceived effectiveness of selected learning activities and the impact of learning style on those learning activities.

This study is part of a five-year agriculture experiment station project focusing on the educational delivery of programs for farmers, particularly beginning farmers. Previous studies have focused on the educational needs of beginning farmers as perceived by themselves and by selected educational providers.

Methods/Procedures

The logistics of achieving a true random sample of the entire population of Iowa farmers was infeasible within the time and financial constraints of this study. As an alternatives to a random sample, a purposive sample was developed. Ary (1996) states that in purposive sampling (also known as judgement sampling) sample elements judged to be typical or representative are chosen from the population.

The Iowa Farm Bureau Federation provided assistance in identifying and distributing the survey instrument to its members on county leadership committees found in all Iowa counties. Respondents' anonymity was guaranteed by the researchers to the Iowa Farm Bureau Federation, and, therefore, the researchers did not have access to the mailing list. Because of this process, a direct follow-up with non-respondents was not possible. A follow-up was done by sending all recipients a reminder request to complete the survey. Also, the anonymity requirement prevented comparing non-respondents to respondents.

The survey was a self-administered mail survey. A total of 1100 surveys were mailed in February, 1999. The reminder was mailed approximately one month following the initial mailing. Three hundred and six-four (33.1%) were returned and 289 (26.3%) were useable.

The survey instrument was reviewed by a panel of experts including agricultural education faculty and graduate students, Iowa Farm Bureau Federation staff, other adult educators, and farmers. The farmers reviewing the study were not included in the sample.

The survey instrument was divided into four sections. Section 1 collected demographic data and characteristics of the respondents. Bracketed data rather than specific individual data were collected to retain anonymity and increase response rate. Section 2 was designed to measure the attitude of the respondents on 26 different statements regarding their education. A 5-point Likert-type scale was utilized. Section 3 of the survey was designed to determine the preferred learning mode of the respondents for nine different agricultural topics. The final section of the survey determined the learning style of the respondents based upon the Kolb Learning Style Inventory.

In purposive sampling, a crucial question is arriving at a typical sample, according to Ary (1996). Since a random sample was not possible, demographic data were collected from the respondents and compared to the Census of Agriculture, Iowa -- 1997. Demographic data from these 289 respondents on farm size (acres), farm sales, and age were compared to census data. The comparisons revealed that the respondents were generally similar to the census data (Miller, K and L. Trede, 2000). Additionally, the useable surveys were returned from all crop reporting districts in Iowa with at least 20 respondents from each district except for one.

Each respondent was asked to complete the Kolb Learning Style Inventory (LSI). The Kolb LSI has a well-developed theoretical foundation (Park and Gamon, 1996). It is considered to be the most widely used learning style inventory (Carricato, 1983) and McCall, 1984). It consists of 12 open-ended statements with four choices available to complete the statement. The respondent ranks the ending for each sentence on how well it fits with how he/she would go about learning something. One word in each item corresponds to one of the four learning modes. The LSI measures a person's relative emphasis on each of the four modes. Responses are summed to determine the "learning mode" which, in turn, are summed to a two-number combination to determine the learning style. As reported by Rollins and Yoder (1993), the reliability estimates (Cronbach's alpha) for the four basic learning modes and the two combination scores of the LSI range from .73 to .88.

Results/Findings

Table 1 shows the learning styles of the respondents. Two hundred eighty-one respondents (97.23%) completed the LSI. For those respondents, the distribution of learning styles was as follows: accommodator (41; 14.6%), diverger (42; 14.9%), converger (60; 21.4%), and assimilator (138; 49.1%). The learning style for eight respondents could not be determined because of incomplete responses.

As noted earlier, Kolb stressed that learning consists of a cycle that includes four learning modes and the order in which they occur and the importance of each depends upon the *individual's learning style. The four learning modes, as described by Kolb, are: concrete* experience (CE, trusting feelings and hunches); reflective observation (RO, listening and watching), abstract conceptualization (AC, using reasoning and logic); and active experimentation (AE, learning by doing). Section C of the survey was designed to determine if the farmers perceived a preference in a learning mode for nine different agricultural topics. Respondents were asked to indicate how they would "best like to learn" about each of these topics. The nine agricultural topics were: crop production practices, technology, and management; livestock production practices, technology, and management; farm markets, marketing strategies, pricing; financial management, records and analysis; machinery and equipment maintenance and repairs; building and facilities maintenance and repairs; whole farm planning and long-term decision-making; resource conservation and sustainability; and technology transfer including computers, GPS, etc. Table 2 shows the distribution of the respondents for each program topic and preferred learning mode.

Table 1.
Kolb Learning Style for the respondents

Learning Style	n	Pct. of Total
Accommodator (AC)	41	14.6%
Diverger (DI)	42	14.9%
Converger (CO)	60	21.4%
Assimilator (AS)	138	49.1%
No Response	8	

Nearly half of the respondents preferred active experimentation (learning by doing) for machinery and equipment maintenance and management and building and facilities maintenance and management (49.6% and 47.3%, respectively). Rating high for active experimentation were crop and livestock production practices and management. Both were above 40% of the total respondents. This indicates a strong preference for learning by doing and experimenting on their own for these agriculture program areas. Rating the lowest as a learning mode for these four topics was concrete experience (learning by intuition and feelings).

The farmers tended to prefer learning about whole farm planning and long-term decision making through abstract conceptualization (using critical thinking skills and logic) rather than active experimentation or concrete experience. Slightly more than 40% of the respondents preferred this mode for whole farm planning.

The farmers were more equally divided among the four learning modes for financial management and markets and prices. For financial management 36% of the respondents preferred active experimentation while 29.8% preferred abstract conceptualization; however, less than 15% preferred concrete experience. The differences were less pronounced for markets and prices with farmers about equally divided among the four learning modes. The most preferred mode for markets and prices was reflective observation (28.5%) and the least preferred mode was concrete experience (20.1%).

Table 2.
Preferred learning mode of the respondents for selected agricultural topics*

	CE	RO	AC	AE
	n	n	n	n
Agricultural topic	%	%	%	%
Crop production mgt.	29	61	50	97
	12.2	25.7	21.1	40.9
Livestock production mgt.	32	56	41	80
	15.3	26.8	19.6	38.3
Markets and prices	48	68	65	58
	20.1	28.5	27.2	24.3
Financial management	35	46	71	86
	14.7	19.3	29.8	36.1
Machinery & eqt. mgt.	38	42	39	117
	16.1	19.3	29.8	49.6
Buildings & facilities mgt.	34	49	43	113
	14.2	20.5	18.0	47.3
Whole farm planning	42	38	96	63
	17.6	15.9	40.2	26.4
Resource conservation	42	74	65	58
	15.8	31.6	27.8	24.8
Technology transfer	30	81	44	71
	13.3	35.8	19.5	31.4

*Note: CE = concrete experience; RO = reflective observation; AC = abstract conceptualization; AE = active experimentation. n=number reporting; %=pct. of total reporting.

Regarding issues related to resource conservation and sustainability, reflective observation (learning by observing) rated the highest (31%) followed by abstract conceptualization (28%). This would indicate a desire to observe others or using thinking/logic to solve resource conservation and sustainability problems.

The farmers tended to prefer to learn about technology transfer by watching and listening and observing others (reflective observation) rather than the other learning modes. Thirty-five percent indicated reflective observation as their preferred learning mode. Ranking second in this category was active experimentation (31.4%). Least preferred was concrete experience.

Respondents were also asked to rate the effectiveness of 26 different learning activities using a 5-point Likert-type scale. These results are shown in Table 3. Talking with a consultant/specialist and attending field days, tours, and demonstrations were the two highest rated items with means scores above 4.0. Rated together (mean=3.97) were attending either single meetings or an in-depth series of meetings on a special topic and studying and analyzing a problem on my own. Those learning activities that rated lower among the farmers were listening to audio tapes, reading the newspaper, watching television programs, participating in either credit or non-credit classes at a local high school, community college, or university. All of these activities had mean scores of 3.38 or less. Being the first in my neighborhood to try something new rated the lowest.

The ratings for the 26 different learning activities were grouped by the four Kolb learning styles for the farmers participating in the study. The means and standard deviations for the top half based upon the overall ratings are shown in Table 4. The learning activities were assigned by the researchers to one or more of the four Kolb learning modes. These designations are also shown in Table 4.

Assimilators, as a learning style, prefer to acquire knowledge by abstract conceptualization (AC) and then transform the knowledge by reflective observation (RO). This group rated "attending field days, etc. (RO)", "reading and studying popular farm publications (AC)", and attending a single meeting (CE/RO)" fairly high as effective learning activities and all three are somewhat consistent with the Assimilator learning style.

Convergers, as a learning style, generally acquire knowledge by abstract conceptualization (AC) and then transform that knowledge by active experimentation (AE). "Studying and analyzing a problem on my own (AC)" and "experimenting on my own (AE)" were two learning activities that were highly rated by this group and both are consistent with the Converger learning style. This group, however, showed a preference towards "attending field days, etc. (RO)" and "attending a series of in-depth meetings (CE/RO)." Both of these learning activities are more consistent with other learning styles.

Acquiring knowledge by concrete experience (CE) and transforming it by reflective observation (RO) are the preferred learning modes of Divergers. Rating high as learning activities for this group were: "talking with a consultant or specialist (CE)", "attending a single meeting (CE/RO)", "talking with family, friends, neighbors (CE)", "attending field days, etc.(RO)", and "attending seminar/class sponsored by Extension (CE/RO)." All of these activities are consistent with the Diverger learning style.

Table 3.
Means and standard devations for the effectiveness of various learning activities*

Learning activity	Mean	Std. Dev.
Talking with a consultant or specialist	4.05	0.76
Attending field days, tours, demonstrations	4.02	0.78
Attending a single meeting on a specific topic	3.97	0.74
Attending a series of in-depth meetings on a specific topic	3.97	0.94
Studying and analyzing a problem on my own	3.97	0.80
Participating in an educational activity that enhances lifelong learning	3.93	0.86
Experimenting on my own	3.90	0.86
Attending a seminar/class sponsored by the Extension Service	3.85	0.86
Watching others and learning from them	3.85	0.82
Trying out new technologies/practices on my own	3.81	0.87
Attending a seminar/class sponsored by an agribusiness firm	3.80	0.72
Talking with family, friends, neighbors	3.79	0.80
Reading and studying popular farm publications	3.75	0.78
Doing my own research on something new or different	3.59	0.89
Reading and studying trade publications and technical journals	3.58	0.82
Using a consulting or marketing service	3.48	0.92
Attending a meeting over the ICN	3.40	0.89
Listening to radio broadcasts on specific topic	3.38	0.87
Watching a video tape	3.36	0.81
Attending class sponsored by local high school	3.31	0.82
Participating in community college credit class	3.27	0.89
Participating in credit class at university	3.26	0.92
Watching a television program	3.09	0.91
Listening to an audio tape on specific topic	3.09	0.93
Reading the newspaper	3.04	0.99
Being the first in my neighborhood to try something new	3.00	0.99

*Note: 5-point Likert scale. 1=very ineffective, 2=ineffective, 3=no opinion, 4=effective, 5=very effective.

Table 4.
Means and standard deviations for the effectives of various learning activities by learning style learning style.

Learning activity	Accomodator Rank*	Accomodator M/SD**	Assimilator Rank*	Assimilator M/SD**
Talking with a consultant or specialist (CE)	1	4.03/0.77	2	4.01/0.72
Attending field days, tours, demonstrations (RO)	2	4.02/0.82	1	4.03/0.79
Attending a single meeting on a specific topic (CE/RO)	5	3.94/0.78	3	3.93/0.74
Attending a series of in-depth meetings on a specific topic (CE/R0)	6	3.93/0.96	6	3.90/0.98
Studying and analyzing a problem on my own (AC)	3	3.97/0.86	6	3.90/0.70
Participating in an activity that enhances lifelong learning	3	3.97/0.83	5	3.92/0.95
Experimenting on my own (AE)	9	3.89/0.90	10	3.79/0.84
Attending a seminar/class sponsored by the Extension (CE/RO)	10	3.88/0.94	13	3.67/0.92
Watching others and learning from them (RO)	7	3.92/0.77	8	3.86/0.94
Trying out new technologies/practices on my own (AE)	8	3.91/0.81	12	3.68/0.85
Attending a seminar/class sponsored by agribusiness (CE/RO)	11	3.77/0.78	9	3.83/0.65
Talking with family, friends, neighbors (CE)	12	3.76/0.84	11	3.75/0.83
Reading and studying popular farm publications (AC)	13	3.69/0.84	3	3.93/0.56

Learning activity	Converger Rank*	Converger M/SD**	Diverger Rank*	Diverger M/SD**
Talking with a consultant or specialist (CE)	6	4.08/0.72	1	4.21/0.69
Attending field days, tours, demonstrations (RO)	3	4.10/0.61	5	3.82/0.83
Attending a single meeting on a specific topic (CE/RO)	6	4.08/0.67	2	3.97/0.80
Attending a series of in-depth meetings on a specific topic (CE/RO)	1	4.28/0.78	5	3.82/0.97
Studying and analyzing a problem on my own (AC)	2	4.18/0.80	4	3.85/0.74
Participating in an activity that enhances lifelong learning	3	4.10/0.79	10	3.71/0.84
Experimenting on my own (AE)	3	4.10/0.84	5	3.82/0.77
Attending a seminar/class sponsored by the Extension (CE/RO)	8	4.06/0.62	5	3.82/0.76
Watching others and learning from them (RO)	12	3.78/0.65	9	3.76/0.89
Trying out new technologies/practices on my own (AE)	10	3.88/0.96	13	3.59/1.02
Attending a seminar/class sponsored by agribusiness (CE/RO)	9	3.92/0.60	10	3.71/0.87
Talking with family, friends, neighbors (CE)	11	3.86/0.45	3	3.88/0.84
Reading and studying popular farm publications (AC)	13	3.70/0.84	12	3.68/0.84

Note: * rank order of ratings assigned by researchers based upon the ratings of respondents
** M=means; SD=standard deviations
the letter designations following each learning activity pertains to one or more of Kolb's learning modes.

Conclusions/Recommendations/Implications

The major purpose of this study was to establish some baseline information regarding the learning style of Iowa farmers and their preferred learning mode for selected agricultural program topics.

The preferred learning style for the respondents was the Assimilator style with nearly half of the respondents preferring this style. Individuals with this learning style prefer to grasp knowledge through abstract conceptualization (using logic and analyzing information) and then transform it by reflective observation (learning by watching others). They tend to learn best by inductive reasoning and testing theories and ideas. This implies that educational providers in agriculture should plan and implement programs that emphasize logic, ideas, concepts, and problem-solving rather than just "learning by doing." For example, educational meetings for farmers that include presentations emphasizing the theory and application followed by panel discussions, case studies, and other methods which allow participants to conceptualize, reflect, and adapt the presented information to their individual situation would be most effective.

Slightly more than 70% of the respondents in this study preferred the Assimilator or Converger learning styles. Both of these learning styles are associated with abstract conceptualization for acquiring information. Learning is then transformed by reflective observation (Assimilator) or active experimentation (Converger). For educational providers, this implies that activities such as field days, tours, demonstrations, providing information via farm publications, providing consulting services, and sponsoring educational meetings are all consistent with these two learning styles. These learning activities were rated higher in terms of effectiveness as compared to credit classes, audio tapes, and watching a television program which are also consistent with these two learning styles.

An interesting aspect of this study was the preferred learning mode of the respondents for selected agricultural program topics. Active experimentation seemed to be the preferred learning mode for agricultural topics related to physical farming resources (land, crops, livestock, machinery, buildings) while abstract conceptualization or reflective observation were preferred for more critical thinking activities such as markets and prices, whole farm planning, and financial management.

Farmers were asked to rate the effectiveness of 26 different learning activities. Rating high among all respondents were the use of consultants or specialists, attending field days, tours, and demonstrations, attending a single or series of meetings on a specific topic, and studying and analyzing a problem on my own. These farmers rated university and community college credit classes, watching a television program, audio tapes, and reading a newspaper much lower in terms of their effectiveness.

Educational providers should consider not only the preferred learning activities but other activities that enhance learning. Additionally, program planners should not plan activities based solely upon popularity. Learning activities are likely to be most effective when the perceived preferred learning mode is combined with a variety of other activities associated with other learning modes. For example, "hands-on" learning for information on new agricultural technology could be combined with "critical thinking" to make an effective program.

While the results of this study may not be generalized to the entire population of Iowa farmers, these results can still provide valuable information to educational providers as they plan and deliver education to Iowa farmers. Additional studies should be conducted with other farming groups to verify these results. Educational providers need further understanding of farmers' learning styles and the topical effect in order to conduct meaningful educational programs for farmers.

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Assessing the Learning Styles of Iowa Farmers

A Critique

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The authors provide a sound basis for the need for this study supported by the development of an excellent theoretical framework. The purpose and objectives are well defined and appropriate. The study utilized a self-administered mail survey to determine the learning styles of Iowa farmers, the preferred learning mode for selected agricultural topics, and the perceived effectiveness of selected learning activities and the impact of learning style on those learning activities.

The authors utilize appropriate methods and procedures for this study. Since a random sample was not practical to obtain, purposive sampling techniques were utilized. Statistical analysis procedures were consistent with the purpose and objectives of the study.

One concern for this reader is the low response rate. Respondents' anonymity were guaranteed by the researchers to the Iowa Farm Bureau Federation. Would it have been possible for the surveys to have been numbered or coded in some way that could have provided a mechanism for at least some followup? The information gained is excellent, however, it would have been nice to be able to generalize to a larger population.

The authors make several recommendations/conclusions in this study. They indicate that educational meetings for farmers that include theory and application followed by a panel discussions, case studies, and other methods which allow participants to conceptualize, reflect, and adapt the presented information would be most effective. Since 70 % of the respondents preferred the Assimilator or Converger learning style, educational programs that include traditional activities such as field days, tours, demonstrations etc. are consistent with these two styles and should continue to be utilized. In addition, active experimentation was preferred for agricultural topics related to physical farming while abstract conceptualization or reflective observation were preferred for activities such as markets and prices, whole farm planning and financial management. These recommendations are excellent. From a practical standpoint, this reader has some questions. How will this information be utilized in Iowa? Will the stakeholders who provide adult education programs to farmers be inserviced or made aware of the findings of this study? What additional studies are planned so the recommendations may be generalized to the entire population? This research has potential to be extremely beneficial to educational providers of adult programs for farmers.

A Qualitative Study of the Influence of Farm Leaders' Ideas on a Sustainable Agriculture Education Program

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Abstract

This paper considers issues related to farmers' control of program planning for non formal agricultural adult education. Discussion is based on an empirical study of a $10 million Canadian sustainable agriculture education program that was initiated, created, and controlled by a coalition of farm organizations, supplanting a traditional role of government. The program, titled Ontario Environmental Farm Plan program, was funded by Canada Agriculture Green Plan federal funds from 1992 to 1997 and included a significant contribution of technical support from Ontario Ministry of Agriculture, Food and Rural Affairs. Theories of participatory extension education, with linkages to the land-grant concept of 'engagement,' provide a theoretical framework for consideration of issues in the case. The concept of engagement guides the formation of partnerships among extension, communities, industry, and government. In the area of sustainable agriculture, however, stakeholders may conflict, presenting challenges to the engagement process. Moreover, agricultural education researchers have produced little data to show effects of stakeholder involvement in program planning, putting the extension system at risk of desiring engagement without a knowledge base about potential impacts. The study was conducted over a 3-year period using cultural anthropology and participatory action research. Political and social aspirations of farmer-planners influenced five program elements: (a) staffing, (b) content, (c) instruction, (d) evaluation, and (e) composition of planning group. The staffing dimension featured non professional grassroots educators employed by a non government organization. Content emphasized multiple subject areas, including farmstead, wood lot, and petroleum storage, appropriate for a wide range of types of farms. Instruction featured participatory and experiential education which emphasized farmers' involvement in environmental assessment and farm planning. Instruction was designed to be compatible with a program policy of confidentiality. In addition to conventional auditing and monitoring, evaluation processes included innovative Peer Review Committees, and collection of 'Barriers to Action' data intended to influence government policies and university research. The program planning group involved leadership of mainstream agriculture, government agricultural ministries (including extension), and hunting-oriented conservation groups. Less involved were leaders of organic and ecological farming associations, traditional supporters of sustainable agriculture education. Recommendations highlight the extent to which forms of non formal agricultural adult education favored by learners may be fruitfully understood as proposals for reconfiguring power relationship among farmers, organizations, and government.

Introduction

Participation interests extension educators because the right forms are anticipated to improve the learning experience individually and collectively. Participatory approaches to program planning are ground in theories of democratic education advanced by John Dewey (1938) and Paulo Freire (1970). The definition of participation used in this paper exceeds that of 'attendance,' and instead indicates important involvement and shared control (see Deshler, 1995 for a review of definitions). 'Engagement' is the term used within the extension system that links the concept of participation to land-grant college activities. Engagement is the organizing concept for a landmark report on the U.S. land grant system sponsored by the W.F. Kellogg Foundation (National Association of State Universities and Land-Grant Colleges {NASULGC}, 1999). The Kellogg Commission report urges universities and extension to manifest engagement by pursuing their activities with greater "respect for partners" and "joint academic-community definitions of problems, solutions, and definitions of success" (NASULGC, 1999, p.3). In practice, the concept of engagement guides the formation of partnerships among extension, communities, industry, and government. In the area of sustainable agriculture, however, stakeholders may conflict, presenting challenges to the engagement process. Moreover, agricultural education researchers have produced little data to show effects of stakeholder involvement in program planning, putting the extension system at risk of desiring engagement without a knowledge base about potential impacts. Discussion is based on an empirical study of a large-scale sustainable agriculture program, the Ontario Environmental Farm Plan program (hereafter, Farm Plan), for which farmers, rather than government, provided leadership.

Theoretical Framework

Agriculture continues to experience a crisis that includes, among rapid financial and structural changes, an awareness of farming's enormous influence on ecosystem health (Environmental Canada {EC}, 1991; National Research Council {NRC}, 1989). The effects on environment are complex; nonetheless, negative impacts of common agricultural practices are well documented, especially contamination of surface and ground water (NRC, 1989). In North America, programs that seek to change farmers' agricultural practices in the direction of environmental stewardship have produced lackluster results when compared to the severity of the problem (Lockeretz, 1990; NRC, 1989). Development specialists Robert Chambers (1997) and Niels Röling and Annamarie Wagemakers (1998) argue that to be effective, scientific-technical institutions must value and elicit authentic participation of farmers and rural people in programs for sustainable agricultural development. Environmental programs that are cooperatively defined by farmers and scientists mobilize local knowledge and are anticipated to change farmers' practices more effectively than technology transfer programs of the past (Röling and Wagemakers, 1998). Extension systems in North America are part of the web of institutions and organizations that seek to affect farmers' behaviors in areas related to the environment as well as to production and financial planning. Interaction and local control figure prominently in the system, making the extension system a North American experiment in democratic education (Blackburn, 1994). Decisions made during extension program development affect learning profoundly, and it is to this phase of adult and extension education that the paper is directed.

Program planning is where agendas are set and resources allocated (Cervero and Wilson, 1994; Heron, 1989). Commonly, program planners' interests compete with learners' needs, resulting in educational designs that muffle learners' influence (Cervero and Wilson, 1994; Freire, 1970; Welton, 1995). Cervero and Wilson urge adult educators to attend to power dimensions in planning, including participation, as ethical practice. Röling and Wagemakers (1998) emphasize participatory learning and adaptive management as a means for refreshing farmer education, particularly "in times of environmental uncertainty" (p. 5).

Sustainable agriculture associations in the U.S. and Canada have supported local associations for farmer learning, but its advocates suggest that the impact on policy and land-grant college activity has been limited (Hassanein and Kloppenburg, 1995; see also examples in Bird, Bultena and Gardner, 1995). Landcare in Australia and New Zealand are celebrated examples of ambitious farmer-directed grassroots organizations dedicated to environmental improvement in agriculture across commodities and associations (Lockie, 1995). In Landcare, farmers determine the nature and scope of programs, utilizing facilitators and coordinators to "foment synergy" rather than transmit content matter (Campbell, 1998). However, most sustainable agriculture programs that have successfully implemented government-stakeholder partnerships in industrialized countries are limited in scale or serve targeted sub-groups in agriculture. For example, programs in the United States, Netherlands, Switzerland and Germany are connected to certification programs for organic and sustainable farming practices or grass-based dairy and beef production (Bird, Bultena and Gardner, 1995; Hassanein and Kloppenburg, 1995; Röling and Wagemakers, 1998). Sociologist Gil Gillespie (1995) argues forcefully that community-level effects of programs with distinct goals for sustainable agricultural development would impact quite differently. In short, there is little empirical data to draw upon that would assist people to predict impacts of competing ideas of different stakeholders on real sustainable agriculture education programs (Chambers, 1997; Uphoff, 1988).

Purposes

This paper is based on a larger study that sought to understand how farm organizations brokered interests of their farmer-members with respect to design of a sustainable agriculture program. This "how" objective of the research required detailed descriptions of behavior and intentions of people at the site over time. A qualitative, single case study approach was therefore applied to obtain the data. The researcher intended to illuminate the practice of engagement of institutions and stakeholders in an applied setting for agricultural and extension education. This paper focuses narrowly on effects of farm leaders' ideas on program design. Other papers focus on coalition-building that preceded the Farm Plan program (Grudens-Schuck, in press), training of grassroots and extension educators in participatory instruction (Grudens-Schuck, 2000), and on facilitators' use of local knowledge in workshops (Grudens-Schuck and Hill, 1997).

Methods

The research focused on a single, large-scale sustainable agriculture program called Ontario Environmental Farm Plan program (Farm Plan) funded through Canada's Agriculture Green Plan program from 1992 to 1997 at $10 million (InfoResults, 1993; Ontario Farm

Environmental Coalition {OFEC}, 1991/1995) (see Table 1). Apropos of learner control, the program was proposed, designed and managed by a coalition of farm organizations, called Ontario Farm Environmental Coalition (hereafter, the Coalition) (OFEC, 1991/1995). Learner involvement in Farm Plan was uncommonly vigorous for environmental farm planning programs at the time (Ervin and Smith, 1996; Grudens-Schuck, in press). The Coalition subsequently involved government ministries in curriculum development, technical support, and teaching. Nonetheless, farm leaders retained control of funding and administration of Farm Plan. The Farm Plan program expected farmers to analyze environmental risks on their farms, write an action plan, and implement environmental projects with assistance of a $1,500 CDN grant. At the close of the study in April 1998, over 12,000 farmers had participated in the Farm Plan program, making this program one of the largest environmental farm planning programs in North America (Ervin and Smith, 1996; Higgins, 1998).

Procedures

The author directed the intensive case study of the Ontario Environmental Farm Plan program from 1995 to 1998, with one-year resident fieldwork in Guelph, Ontario, in 1996-97. The study used cultural anthropology combined with participatory action research to produce an ethnography. Ethnography is a cultural account which pays close attention to language, behavior, settings, and the connections among them (Geertz, 1973). Ethnography was developed within the discipline of anthropology, and is considered an advanced, distinct approach to research in the qualitative tradition (Erickson, 1990; Lincoln and Denzin, 1994). Ethnography emphasizes immersion at the site and long association (e.g., months or years) with people important to the research using informal and formal information gathering techniques lumped under the general term, 'participant observation.' Ethnography also requires that at least part of the results be presented in narrative form, including verbatim quotations, so that readers may experience the data more directly than is possible through presentation of statistical results (Erickson, 1990; Geertz, 1973; Lincoln and Denzin, 1994). Ethnographic research methods featured 36, two-hour interviews; direct observation of 13 Farm Plan workshop sessions with total attendance of 195 farmers; and 53 distinct events involving 256 hours of participant observation of farms, organizational meetings, farm shows, and field days. Methods also included document review of current and pilot editions of the Farm Plan workbook and other internal documents. A five member planning group composed of insiders and the author negotiated selection decisions, gathered data at critical reflection sessions, and collaboratively planned and presented reports consistent with the participatory action research approach to the study (Greenwood and Levin, 1998). Insiders included a workshop facilitator, two farm organization staff, and a ministry extension educator, all responsible for ongoing Farm Plan activity. Analysis consisted of nested sets of coding schemes subject to member checks (people at the site assisting determination of veracity of claims) and peer debriefing (a technique analogous with internal validity check which reviews logic and consistency of coding schemes). The result is a set of themes that explain the ways in which local people analyzed their situation. This type of data is important for educators who desire to understand how and why local people act in the setting. Such knowledge can be used to design successful extension education programs for particular learners or may explain why past efforts were rejected (Erickson, 1990; Cervero and Wilson, 1994).

Table 1

Essential Facts about Ontario Environmental Farm Plan Program 1992-1998

1. How many farmers attended workshops?	12,000
2. How long were workshops?	2 day-long workshops one week apart (16 hours). Sometimes shorter.
3. What materials were used in workshops?	Farm Plan workbook, instructional videos, soil maps, best management practices booklets, fact sheets.
4. Who created workshop materials?	Ministry extension through 23 technical committees with farmer/scientist membership.
5. What was the topic range?	Extensive field crops to grapes; livestock to greenhouse. Also woods, wells, fuel and septic.
6. What were instructional methods?	Participatory education, lecture and hands-on environmental self-assessment.
7. Who was administrative lead for funding?	Ontario Federation of Agriculture (non-governmental organization).
8. Who officially delivered EFP?	Ontario Soil and Crop Improvement Association (non-governmental organization).
9. Who taught EFP workshops?	Team composed of one Soil & Crop staff and ministry extension educator.
10. Who attended workshops?	Farmers only; any commodity or scale.
11. Where were workshops held?	County-by-county basis; every county in Ontario.
12. What was amount of financial incentive?	$1,500 CDN (less than $1,100 US).
13. How did farmers obtain financial incentive?	Completed farm assessment and action plan. Received go-ahead from Peer Review Committee.
14. Who staffed Peer Review Committees?	Committee of local farmers plus Soil and Crop Program representative.
15. Did extension or government see farmers' assessments or plans?	No.
16. What is the Ontario Farm Environmental Coalition?	Four farm organizations as lead. Approximately 35 other farm organizations (mainly commodity) as participants.

Results

Farm leaders designed Farm Plan to reflect their collective analysis of farmers' experiences with environmental regulation, the sustainable agriculture movement, and extension education. Specifically, farm leaders based their approach to adult education on local theories about the ways past programs discouraged farmers from acting environmentally. This section discusses farm leaders' beliefs about effective adult education related to program design for Farm Plan. In particular, five features influenced heavily by farm leaders constituted a program that differed in important ways from many extension and government programs.

Staffing featured grassroots educators

A prominent feature of the Farm Plan program was employment of a cadre of grassroots facilitators drawn from the ranks of local farm families; most had not considered themselves educators previously. Grassroots educators were employed by Ontario Soil and Crop Improvement Association (hereafter, Soil and Crop), a farm organization with a history of successful third party delivery of government programs (Dyszuk, 1991). Farm leaders claimed that grassroots education and recruitment would be able to involve farmers in "threatening" issues, like environmental improvement, better than extension. This claim figured prominently in committee discussions and in Farm Plan publicity. Farm leaders also designed the program to be confidential. Confidentiality prevented government agency staff from reviewing farmers' assessments of environmental hazards and risks on their farms documented via the Farm Plan process. Confidentiality was an uncommon feature of environmental farm planning programs at the time (Ervin and Smith, 1996). Confidentiality was aggressively sought by farm leaders in response to farmers' fears of vulnerability to government prosecution (OFEC, 1991/1995). This policy distinguished Farm Plan from U.S. farm planning programs in which extension and government agency staff provided leadership for individual on-farm environmental assessments, for example in the New York City Watershed program (Malvicini, 1992; McLeod, 1995). In Farm Plan, grassroots facilitators were the only personnel who could link a farmer's name with his or her farm plan.

The farming background of grassroots Soil and Crop facilitators also figured prominently in workshops. In an interview, one facilitator explained why he told farmers in the workshop that his own farm was rated an "an environmental disaster" using the Farm Plan assessment. He described how he used his authentic personal experience to gain "buy in" (e.g., commitment) from farmers, and relay their fears about reporting environmental problems on their farms. He said,

> I am quite ready and willing to admit it {poor environmental rating}. I don't believe that for a second there is anything incriminating about this program. I want to get that message across loud and clear. . . . I don't feel at risk. I want them to get that feeling.

Some bitterness existed among extension educators regarding farm leaders' decision to plan and publicize the program as "farmer-driven and farmer-led." An extension educator remarked, when asked in an interview if he encouraged farmers to attend Farm Plan workshops,

> At the beginning, we got told fairly bluntly, "Don't do that. We don't want the perception that it's an OMAFRA {Ministry} program. . . . Since it's the environment, they {Farm Plan} don't want to be perceived as a government program. They want to be perceived as a *farmer*-run program.

Grassroots and extension approaches were distinct even to staff members who were enthusiastic about partnership dimensions of the program. A grassroot educator put it,

> I think it's beautiful in the way it's set up being a partnership. . . It's got the best of both worlds working together.

This educator expressed greater approval than the extensionist, but note the firmness of the shared assumption that extension and farm organization approaches to education differ.

Instruction featured participatory techniques

Soil and Crop facilitators used participatory educational techniques in Farm Plan workshops. During participatory exercises, farmers developed their own reasons for taking charge of environmental problems, engaged each other in development of solutions, and challenged each others' assessments of hazards. Extension staff did not, on the whole, disparage participatory education, and some had been trained in participative techniques. Extension staff members were, however, more likely to talk about participatory methods as "ice breakers" or as techniques for making instruction more fun, toward outcomes of increased compliance or retention of content matter. Soil and Crop staff, on the other hand, articulated a more comprehensive account of participatory education that included instrumental outcomes (e.g., content knowledge), but valued equally the process by which farmers overcame dependency and resistance with respect to environmental stewardship (attitudinal change, action orientation). Overall, grassroot educators' accounts of participatory education were more consistent with tenets of democratic education for adults than extension staff members' (per Deshler, 1995 and Chambers, 1997). One Soil and Crop facilitator exclaimed,

> It's not *my* workshop. It's *these people's* workshop. It's my job to facilitate it. And that's why I do shut up. They do the talking.

Later, the author asked the same facilitator about resistance of some educators to using silence and tolerating discomfort of participants during participatory exercises, such as when facilitator or peers confront each other on ideas. The following conversation resulted.

> **Researcher:** But you didn't . . . cut it short to save their uncomfortableness. You risked letting them be uncomfortable.
>
> **Facilitator:** So why don't they want to make them {farmers} uncomfortable?

> (Laughs). It makes *them* {other educators} uncomfortable. It makes *them* uncomfortable to make the *other ones* {farmers} uncomfortable . . . . That's probably part of what's wrong with our society. Everybody thinks they should be comfortable all the time. Hell, when you *do* something is when you become uncomfortable.

Content emphasized experiential learning and farmers' knowledge.

The Farm Plan workbook is composed of 23 chapters of environmental assessment checklists and an Action Plan based on University of Wisconsin's Farm*A* Syst environmental farm assessment (Mulla, Everett and DiGiacomo, 1998). Farm Plan's emphasis on active learning and control by farmers distinguishes the workbook, however, from other environmental farm planning programs led by government and extension (Ervin and Smith, 1996). As noted earlier, Farm Plan expected farmers rather than scientific experts to complete the 23-chapter assessment and Action Plan (OFEC, 1994). The research documented that when facilitators introduced the large, glossy workbook, farmers sighed, frowned, or joked. "It's a ton of stuff," was a typical remark. The data suggest that the decision to require farmers, not experts, to complete the workbook was rooted in farm leaders' belief that all farmers in Ontario were capable of learning and combining scientific knowledge with local, practical knowledge. Farm leaders also believed that farmers would learn best by becoming involved in and responsible for environmental activity. Through experiential education, farm leaders also intended to counter what they saw as complacency among some farmers, and increased nervousness among others, resulting in dependency on government with respect to environmental decision making. Farm leaders suggested that farmers had become mired in a set of defeatist assumptions about the feasibility of environmental activities that contributed to passivity. In an interview, one said,

> If it looks like the only solution is to build a big manure storage, then the farmer is going to sit there and say, "Well, I can't afford it. So I am not going to do anything."

The study also revealed that design of the workbook expressed organizational interests of farm leaders by preventing individual farmers from calculating a summary statistic related to their farm's overall sustainability through Farm Plan. The workbook is designed so that the farmer cannot, for example, score an 80% (e.g., "good" or "green") rating with respect to environmental stewardship. At the time, avoidance of conflict among commodity organizations was imperative to farm leaders in regard to environmental issues captured by the question, *Who's greener?* (i.e., Who is more environmental?) Fine-tuning the assessment to produce a summary statistic was anticipated to worsen inter-organizational conflicts rather than build solidarity. A farm leader explains the meaning of solidarity in this context,

> Through this organization you can bring together commodity groups for a common cause who would ordinarily be at each other's throats because they are competing with each other in the marketplace. If we come out of this thing {Farm Plan}

> having just accomplished that we will have accomplished something. . . We are going to need that solidarity . . . . particularly with the government.

Moreover, the intellectual effort required to produce a program that would deliver a reliable summary statistic (i.e., computer model) was anticipated to require tremendous resources. Farm leaders instead allocated financial resources to aforementioned grassroots hiring; to writing a workbook that addressed all commodities in an ambitious 23-chapter workbook; and to offering the program province-wide to all farmers. This approach directly contrasts with most government programs which target particular crops or livestock; focus on lands with slopes that surpass a particular threshold; or channel resources to farms in hydrologically-sensitive watersheds (Ervin and Smith, 1996).

Evaluation utilized peer review and aggregate data

Among conventional forms of evaluation (Helmut Loewen, 1995; InfoResults, 1993), the Farm Plan program created two additional assessment processes which directly served farm leaders' interests: Peer Review and aggregate data. Farmers who participated in workshops were encouraged to submit completed Action Plans for anonymous review of "appropriateness" to committees called 'Peer Review'. Submission was voluntary, but necessary to receive incentive grant. Soil and Crop hired over 200 local farmers to staff Peer Review Committees. The farmer-reviewing-farmer policy was philosophically consistent with both the confidentiality policy and with the grassroots staffing decision. The peer review system also pressed the issue of ownership of the program by the farming community on a county-by-county basis, spinning off professional development programs on environmental assessment for farmers on Peer Review Committees so that committees made responsible and consistent decisions across counties.

In another form of assessment, farm leaders required Soil and Crop facilitators to collect anonymous data from Action Plans, called "aggregate data." Included in these data were farmers' responses to a section called "Barriers to Action," a checklist which allowed farmers to document reasons why they declined to fix a particular environmental problem (OFEC, 1994). This feature mobilized farmers' local knowledge of the financial, social, and technical feasibility of environmental improvements. The Barriers to Action list also encouraged honesty in the self-assessment process by providing an opportunity to declare personal and professional reasons for not taking immediate action on existing environmental hazards and risks on the farm. Farm leaders used the data to support positions on determination of extension priorities and on allocations of research funds. The Barriers to Action section also leant credibility to grassroots facilitators' claims that farmers could take control of their individual Farm Plan, even to the extent of declaring specific environmental improvements not a personal priority.

Mainstream farm organizations and extension dominated planning

It is notable that farm leaders planned privately, using organizational resources available to them, then advanced their ideas through a professional policy booklet that startled ministry officials when it was released (Fagen, Kennedy and Van den Broek, 1992; OFEC, 1991/1995).

Extension staff subsequently entered into a period of cooperation with farm leaders to develop the workbook and technical guides. Government staff, farm leaders, and members of selected conservation groups collaboratively wrote each of the 23 chapters of the Farm Plan workbook.

Extension and the Coalition formed a partnership for many aspects of programming, with membership negotiated between them. However, analysis showed that environmental and organic farming organizations (groups with a mission beyond hunting and game conservation) remained uninvolved in the coalition--uncommon for a sustainable agriculture program. According to a member of one of the uninvolved organizations, mainstream farm leaders "pulled their wagons in a circle" when they composed their learner-directed program planning team. Importantly, prior to Farm Plan, the ministry had composed a discussion group from across the spectrum of production approaches (conventional, mainstream, organic) and environmentalist activity (activist, conservationist, preservationist), but leaders involved in Farm Plan rejected this group as a basis for cooperative planning.

Conclusion

This paper presents findings about farmers' influence on adult education program design. Overall, Farm Plan is a demonstration of farm leaders successfully advancing sustainable agriculture while working with extension in ways that reconfigured power relationships through an adult education program. Participation of prospective learners in early stages of program planning is advocated for adult education programs that address complex scientific issues with unmistakable social and economic components, such as the environmental crisis. Nevertheless, meaningful participation of stakeholders is described in the literature as rare and difficult to accomplish. One of the study's basic but noteworthy findings is that farmers successfully influenced program design, affirming theoretical claims that substantive involvement of key stakeholders is feasible. The findings also support claims in several extension handbooks that 'collaboratives' and farmer-initiated ideas may come to fruition even when stakeholders' program assumptions differ from professional adult educators' (Taylor-Powell et al., 1998; Wells, 1988). Disagreement is not inevitably a death knell for engagement.

Specifically, the study documented five dimensions of adult agricultural education that were strongly affected by prospective learners: (a) staffing, (b) content, (c) instruction, (d) evaluation, and (e) composition of planning group. Across categories, one may apply two sorts of analyses, one social and cultural, the other from within the critical tradition of adult education. First, circumstances of the case lead to the thorny issue of how to conceptualize the turn about from expert-led to learner-led in the context of Ontario extension education. Chambers (1997) and other writers suggest that under circumstances of rapid change and increasing distance of professionals from constituents, supporting clients in the driver's seat allows changes to be based on timely social and cultural information that stakeholders uniquely possess. One may view grassroots, farmer-to-farmer staffing in this light, including the peer review process. Both practices rely upon farmers' practical knowledge of local environmental conditions, social and fiscal dimensions of environmental issues in related to agriculture, and local uses (and abuses) of technologies.

Direct line social and cultural theory does not, however, account for political bids apparent in farm leaders' strategies for Farm Plan education. Here one benefits from analysis possible within the critical tradition in adult education (Cervero and Wilson, 1994; Welton, 1995). The confidentiality policy, for example, manifests the farming community's concerns about regulatory, command-and-control dimensions of environmental education, salient despite extension's historic emphasis on democratic education. The confidentiality policy undergirds the decision to employ non-extension staff (grassroots Soil and Crop farmer-educators) and the decision to work through local Peer Review Committees. Aggregate data and the Barriers to Action, on the other hand, demonstrate farm leaders' desire to influence policy by documenting protest by farmers related to cost and feasibility of environmental improvements on farms. Additionally, by asking farmers to do more than they believed possible with respect to environmental assessment, farm leaders manifested their goal of decreasing farmers' dependency on government and scientific-technical institutions. The amount of work that the program expected farmers to complete for Farm Plan was well outside the organizational culture of extension. More often, extension educators are coached to make tasks easy for farmers, with the unstated behaviorist assumption that compliance with unpalatable rules (i.e., acting on behalf of the environment) requires a tangible reward, principally, time-saving instructional approaches (Blackburn, 1994; NRC, 1989).

Finally, one must consider the finding that farmer-driven aspects of the Farm Plan program resulted in exclusion of organic and activist environmentalist groups. There is an instrumental, practical explanation, suggesting as per Applebea (1993) that greater diversity would have prevented the unlikely occurrence of the Farm Plan program taking flight. In other words, homogeneity eased the challenges of pulling together disparate commodity groups. From the perspective of critical theory, there is another view--one would expect learners to exhibit dependencies and stereotypical assumptions about themselves and others even when they become planners. Stakeholders may be reflective and open to new ideas on one front (i.e., environmentalism) but not on another (including former adversaries). To assume otherwise is to romanticize the farmer-to-farmer process as devoid of interpersonal conflicts that besiege the rest of us (Heron, 1989). Exclusionary characteristics are, in short, unsurprising in development of the autonomy of most groups (Heron, 1989; see also Grudens-Schuck, in print).

Recommendations

Several recommendations for extension program planning practice can be derived from this study. Three recommendations stand out as crucial to the engagement process: (a) the importance of social and political dimensions of teaching and learning; (b) the likelihood that learners experience education differently from educators; and (c) the value of the professional educators' informed view of exclusionary tendencies people bring to educational planning.

First, rather than using a classical, step-wise program planning process for development of objectives, extension educators may support stakeholder engagement more fully if they anticipate a political dimension in addition to a focus on subject matter. Moreover, including political elements in program design may be beneficial for rather than uniformly unproductive. This recommendation does not suggest throwing either attention to content or ethics to the wind. The recommendation instead emphasizes Cervero and Wilson's (1994) democratic approach to program planning whereby adult educators talk openly about social and political aspirations of interested parties (including those of adult educators) rather than focus exclusively on content matter objectives.

Second, this study affirms prior qualitative research that underscores the surprising degree to which learners bring different meaning to ordinary dimensions of educational practice, such as: Who teaches programs (extension or farmers?). How much work is involved (little or "a ton"?). Who assesses quality (scientists or peers?). For topics like sustainable agriculture, the identity may be more important to learners than for other program areas. Moreover, suppositions of educators, such as the 'make things easy for farmers' ethos shared by many extension staff, should be questioned and not applied uniformly to all program decisions.

Third, in processes of engagement, stakeholders may act according to their own preconceived ideas about which other people and organizations are appropriate to involve. Extension educators, as part of ethical professional practice, must be alert to exclusionary tendencies of groups. The author does not advocate forcing equitable participation in any one project. However, one may still strive for appropriate involvement of identifiable stakeholders over time firmly and strategically (Welton, 1995).

Acknowledgments

Thanks to staff and farmers associated with Ontario Environmental Farm Plan program, the Great Lakes Protection Fund, the President's Council on Cornell Women, and Hatch Act and State of Iowa funds. The author also appreciated reviews by three anonymous reviewers.

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A Qualitative Study of the Influence of Farm Leaders' Ideas on a Sustainable Agriculture Education Program

A Critique

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The author did an excellent job of developing the need and theoretical framework for this study. A three year qualitative, single case study approach to consider issues related to farmer's control of program planning for non formal agricultural adult education was utilized. The study used cultural anthropology combined with participatory action research to produce an ethnography.

Ethnographic research methods featured 36, two-hour interviews; direct observation of 13 Farm Plan workshop sessions with total attendance of 195 farmers; and 53 distinct events involving 256 hours of participant observation of farms, organizational meetings, farm shows and field days. A five member planning group composed of insiders and the author negotiated selection decisions, gathered data, and collaboratively planned and presented reports consistent with the participatory action research approach of the study. Analysis consisted of nested sets of coding schemes subject to member checks and peer debriefing. The result was a set of themes that explain the ways in which local people analyzed their situation.

The author identified three recommendations that stand out as critical to the engagement process: (1) the importance of social and political dimensions of teaching and learning; (2) the likelihood that learners experience education differently from educators; and (3) the value of the professional educators' informed view of exclusionary tendencies people bring to educational planning. These recommendations could have tremendous impact on the way adult educators plan and implement programs. From a practical standpoint, this reader has some questions. How will this information be utilized in Iowa? What additional studies are planned as a follow-up to this research?

The author is to be commended for utilizing a qualitative approach involving action research in this study. While this research does not create the volume of data tables we normally see in quantitative research, the information gained has tremendous potential to make a difference and answer many "so what" questions. If properly utilized, this study will be extremely beneficial to extension program planners as they develop future programs. We need more studies like this in Agricultural Education.

Evaluation of a Workshop for Agricultural Entrepreneurs

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Abstract

The purpose of this study was to assess the impact of a series of short-term, small business workshops delivered at the Oklahoma Food and Agricultural Products Center by investigating the knowledge and attitudes of workshop participants. The objectives developed to accomplish the stated purpose were to: 1) Identify selected personal and professional characteristics of workshop participants; 2) Assess change in knowledge as a result of participation in the workshop; 3) Assess change in attitude as a result of participation in the workshop; 4) Determine what relationships, if any exist between the characteristics of workshop participants and their change in knowledge and/or attitude related to topics presented in the workshop.

A census of the 35 workshop participants was taken. A pre-test, post-test design was used to gather the data. On the pre-test, information was gathered about the participants and their business interests. A test composed of items relating to the objectives of each workshop session was developed and given to the participants at the beginning and then again at the end of the workshop. A semantic differential used to assess the participants' attitudes related to starting a small business was also included on the pre-test and post-test instruments. Data from these two instruments were compared to determine the impact of the workshop on the participants' knowledge and attitudes related to the topics presented.

From the findings, the researchers concluded that the typical individual attending the workshop was middle aged, male, and well educated. It was also concluded that the short-term small business training workshops did significantly increase the knowledge of individuals attending the workshop, however, it did not alter the overall attitude of an individual toward starting a small business.

Introduction

In 1996, the Food and Agricultural Products Center (FAPC) was dedicated with the following mission: "To generate and disseminate, through educational programs and technical and business assistance, information that will stimulate and support value-added food and agricultural products processing in Oklahoma," (Hunt, 1998). Today, the institute serves as a means to reduce the gap between academia and the private sector, creating a channel in which business people from across the state can gain valuable business and technical knowledge from the staff of the Center. One of the primary objectives of the Center is the continuing education of individuals involved in the food industry.

It is through continuing education activities that the FAPC has been able to work more closely with the private sector, therefore creating opportunities for the food and agricultural products processing industry in the state to expand and grow. The staff has developed and conducted many programs aimed at meeting the needs of individuals and groups in the food industry. One of the primary methods used to deliver these educational programs has been the short-term workshop.

Typically, these workshops have been one to two days in length. Most often, the faculty and staff who present the program developed them. Workshop focuses have ranged from "Overcoming Fears of HACCP for Meat Plants" to the training of sensory testers. The workshop that was the subject of this research was entitled "Basic Training." The workshop was intended for persons interested in starting a small business related to food product development and processing.

The focus of the small business workshops was not to develop the business for the participants, but to provide these individuals with the correct tools to develop their own business. The "Basic Training" workshop featured a variety of speakers ranging from university faculty and representatives of government agencies to industry personnel from around the state.

To evaluate a program such as "Basic Training," principles of adult education must be considered. According to Sork (1997), there are several concepts that are relevant in the planning and implementing of any adult education program. These include:

1. Honoring the learner's experience, perspective, and expectations.
2. Involving stakeholders in planning.
3. Basing programs on the needs of learners.
4. Clarifying the aims or goals of the workshop.
5. Incorporating workshop processes that actively involve learners.
6. Assessing program outcomes in addition to learner satisfaction.

It is this sixth point stated by Sork that is the foundation for this research. In the past, program developers thought that as long as workshop objectives were being met, the program could be deemed a success (Bush, Mullis, & Mullis, 1995). They went on to state that for years it had become a custom to perform an evaluation at the completion of a workshop to determine if the objectives of the workshops were met. Little, if any, thought was invested in program improvement. The same type of evaluation had been conducted with several FAPC workshops Oklahoma Food and Agricultural Products Research and Technology Center, 2000)

According to Bush, Mullis, & Mullis (1995), questions left unanswered by merely evaluating the objectives were: What factors led to the success of the workshop? Why was the workshop a failure? Rossi, Freeman, & Lipsey (1999) agreed with this idea when they suggested that evaluation might be useful in providing information for program improvement. Ayers (1989) noted that evaluation could help change the format of the workshop by helping presenters decide whether a certain portion of the workshop needed to be changed or eliminated from the program, therefore allowing the workshop to reflect the needs of the audience and not those of the program developers.

McCormick (1994) stated that education is the process of changing behavior. He further said that these changes in behavior are to be classified into three categories: knowing behavior, doing behavior, and feeling behavior. Thus, if the purpose of a workshop is "education," it stands to reason that these changes in behavior should be evaluated. McKenney and Terry (1995) conducted research to measure the effectiveness of workshops in changing audience perception, attitude, and knowledge of xeriscaping as a result of participating in a workshop. They found that the knowledge and perceptions of the workshop participants did increase significantly and concluded that the educational program was a success.

Prior to this study, there had been no effort to determine if these educational programs led to a change in the knowledge and/or attitude of participants. Such research was needed to determine the impact and usefulness of these workshops in helping to meet the mission of the Oklahoma Food and Agricultural Products Center.

Purpose and Objectives

The purpose of this study was to assess the impact of a series of short-term, small business workshops delivered at the FAPC by investigating the knowledge and attitudes of workshop participants. The following objectives were developed to accomplish the stated purpose:

1. Identify selected personal and professional characteristics of workshop participants.
2. Assess change in knowledge as a result of participation in the workshop.
3. Assess change in attitude as a result of participation in the workshop.
4. Determine what relationships, if any exist between the characteristics of workshop participants and their change in knowledge and/or attitude related to topics presented in the workshop.

Methods

The population consisted of all of the 35 individuals who attended the Basic Training workshops offered by the Oklahoma Food and Agricultural Products Center during the months of August, September, October, and November of 1999. Since the participant group was of a manageable number and easy to access, a census approach was utilized in this study.

The small business workshops lasted approximately four hours beginning at noon with a sack lunch and adjourning by 4:30 p.m. Five "Basic Training" workshops were held, each during the third week of every month from July through November. The agenda for the workshops included presentations on business planning and plan components, product evaluation and marketing, patents and trademarks, health regulations, processing and co-packing, labeling requirements, legalities and liabilities, and assistance available to entrepreneurs. Slight modifications in the order of the agenda were made from one workshop to another due to presentation conflicts; however, each of the topics listed were covered at each workshop.

The instrument used in the study was a researcher-designed questionnaire. The researcher attended the July workshop to observe the sessions and gather information to develop items for the instrument. From the July session, the researcher was able to gather materials distributed to participants and take notes during presentations by experts. A videotape was also recorded during this session to assist in the development of the instrument. The researcher's committee was consulted to assist with the design and clarity of the instrument. Workshop presenters reviewed the items on the instrument to ensure they were appropriate and accurate.

The instrument used to collect the data for this study consisted of three sections. Section one was designed to assess the participants' knowledge about the topics taught in the workshop. It consisted of 19 multiple-choice questions with "I don't know" being one of the possible responses.

The second section of the instrument contained a 14 item semantic-differential scale. According to Oppenheim (1966) Charles E. Osgood developed the semantic-differential with the help of his colleagues while working with the quantitative study of meaning. The semantic-differential consists of several bipolar adjectives and a seven-point rating scale. Each scale is weighted and defined by two extreme adjectives. Examples used in this study included: fast/slow, happy/sad, pleasant/unpleasant, and clear/hazy. Respondents were responsible for rating each of the word pairs on the scale. The semantic-differential scale used in this study attempted to measure changes in participant attitudes toward starting their own business. The third section included six demographic items that were included only on the pre-test questionnaire.

In the development and use of criterion-referenced tests, the issue of *content* validity is of primary importance. Test items were developed as described in instrumentation in accordance with test specifications; therefore, responses of participants would provide valid estimates.

The data gathering procedure was a pre-test/post-test design. Questionnaires were distributed at the beginning of the first session of the workshop and again at the end of the final session of the workshop.

In order to further establish reliability, pre- and post-questionnaires were pilot tested at the August workshop to determine if refinements were needed. Cronbach's alpha was used to determine internal consistency. The calculated Cronbach alpha for the instrument used in this study was .70. This alpha is considered acceptable therefore no structural modifications were made to the survey upon completion of the pilot test. Since no changes were made in the instrument, individuals participating in the pilot test were also included in the data analysis.

To report the data, descriptive statistics, measures of variability, and inferential statistics were used. Included in the study as a measure of variability/dispersion were standard deviations of mean scores. In addition, analysis of variance was performed on mean scores of both the pretest and posttest.

Responses from the semantic differential were assigned numerical values for the purpose of calculating a mean response. A response recorded on the positive side of the bipolar adjective scale received a value of seven (7), while responses found on the negative side received a one (1) with values six (6) through two (2) completing the other possible responses. Mean scores were then calculated for each pair of adjectives. An overall mean score was also calculated for the groups.

Data were analyzed to determine if there existed any correlation among test scores and demographic characteristics. Conventions used by Davis (1971) to describe the magnitude of correlations were used in this study. Therefore, a correlation of .70 or more indicated a strong correlation, .50 - .69 substantial, .30 - .49 moderate, .10 - .29 low, and anything less than .10 as negligible correlation.

Data were analyzed using SAS for Windows Release 6.12.

Findings

Characteristics of Workshop Participants

The respondent group included all 35 participants who attended the Basic Training workshop. The age of participants ranged from 29 to 74 years with 49.64 being the mean. Table 1 shows data relating to the age of participants.

Table 1.

Distribution of Workshop Participants by Age

Age	Frequency (N=33)	Percentage (%)
20 years of age or less	-	-
21-30	1	3.0
31-40	8	24.2
41-50	8	24.2
51-60	11	33.3
61-70	3	9.0
71 years or more	2	6.0
Missing data	2	6.0
Total	33	100.0

*Mean age = 49.64 years

Of the 35 respondents, 18 (54.5%) were male and 15 (45.5%) were female. Slightly more than 69% (24) of the participants were Caucasian/White, 13% (4) were Hispanic and 9% (3) were Native-American. Figure 1 shows the percentages of the six ethnic groups represented among the participants.

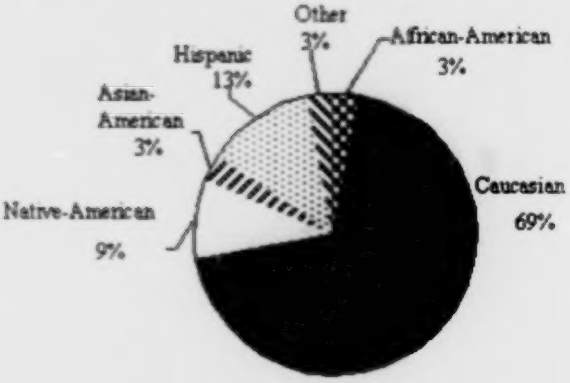

Figure 1. Distribution of workshop participants by ethnicity.

Eleven (35%) individuals who attended the workshop had received a bachelor's degree, while eight (26%) individuals had only completed one or more college classes yet had not received a degree. More than half of the workshop participants held a baccalaureate degree or higher. Data addressing the participants' level of formal education are illustrated in Figure 2.

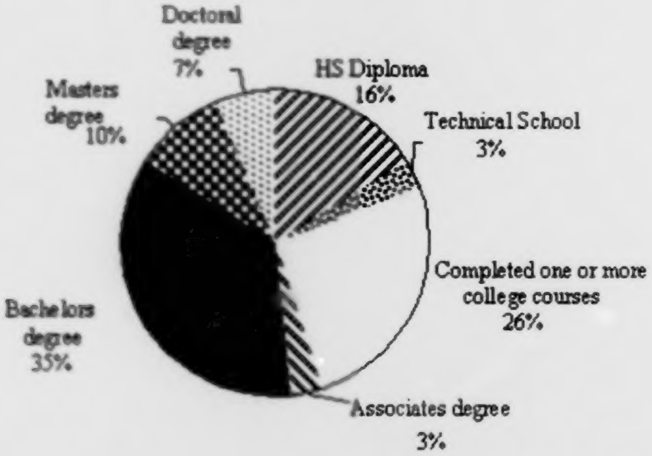

Figure 2. Highest level of formal education completed by workshop participants.

Participants were asked to indicate the food product in which their business would focus. Nine of the 28 people who responded to this item indicated they were interested in businesses dealing with meat products. Nearly half (17) were interested in products classified as "other foods." These included items such as salsa, health drinks and baked goods.

Persons attending this workshop were asked if they participated in any other small business training workshops. The vast majority (93.3%) said "no."

Knowledge Change of Workshop Participants

There were 19 items on the knowledge assessment section of the instrument. For scoring, each correct answer was given a value of "1," so a perfect score on the knowledge assessment would be 19.

The knowledge assessment score for all workshop sessions on the pretest was 9.34 (49.15%) correct responses with a posttest score of 14.46 (76.11%) correct responses. The resulting P-value for the combined group was 0.001 (see Table 2). Therefore, there was a statistically significant difference in pretest and posttest scores of workshop participants.

The data were analyzed to determine if differences existed among the four workshop sessions. Analysis of pretest scores did not reveal a statistically significant difference (P-value .6379) among the four groups. In addition, after analyzing the posttest no statistically significant difference in those scores was found (P-value .1337). Therefore, the scores from the four workshops were combined for all further analysis.

Table 2.

Analysis of Variance Comparison of Mean Test Scores

Group	f	Pre Score[a]	Test % Correct	Post Score[a]	Test % Correct	F value	P value < F value
August	7	8.14 (3.63)[b]	42.8	12.00 (3.16)	63.2	4.50	0.0554
September	8	9.25 (2.12)	48.7	14.50 (1.93)	76.3	26.84	0.0001*
October	13	9.38 (2.36)	49.4	15.46 (2.30)	81.4	44.21	0.0001*
November	7	10.57 (3.31)	55.6	15.00 (2.52)	78.9	7.94	0.0155
Combined	35	9.34 (2.79)	49.2	14.46 (2.68)	76.1	61.20	0.0001*

[a] Score is out of a possible 19.

[b] standard deviation.

* Significant at the alpha .05 level.

An item analysis of the data pertaining to the knowledge questions was also performed. Here, the items were grouped by the topic for which they were developed to test. The workshop topic with the greatest improvement in score from the pretest to the posttest was session dealing with "Assistance Available to Entrepreneurs." The average score of the participants increased 40% for this topic. Three other topics had an average post-test score more than 35% higher than the pre-test score. Workshop participants scored highest on the topic area of "Business Plan and

Components" on the pre-test as well as the post-test. The least change in post-test score from pre-test score was for the sessions on "Legalities and Liabilities." Data pertaining to the comparison of scores for individuals based on workshop topics are summarized in Table 3.

Attitude Change of Workshop Participants

Change in attitude was measured using a 14-item semantic-differential instrument. A response recorded on the end of the positive side of the bipolar adjective scale received a value of seven (7), while responses marked on the end of the negative side received a one (1). The response choices in between were valued at six (6) through two (2).

Data reported in Table 4 show a F-value of .32 and P-value of .5922, indicating there was not a statistically significant change in workshop participants' attitude as a result of attending the workshop.

Table 3.

Comparison of Combined Scores by Workshop Topic

Workshop Topic	% Correct-Pre	% Correct-Post	Difference Pre to Post	F value	P value < F
Assistance Available to Entrepreneurs	38.6	78.6	40.0	23.26	.0001*
Product Evaluation and Marketing	20.0	57.1	37.1	11.58	.0011*
Processing and Co-Packing	40.3	76.2	35.9	24.08	.0001*
Patents and Trademarks	47.1	82.9	35.8	38.5	.0001*
Health Regulations	31.4	64.3	32.9	18.81	.0001*
Labeling Requirements	34.3	57.1	22.8	3.78	.0561
Business Plan and Components	72.9	87.9	15.0	11.43	.0012*
Legalities and Liabilities	62.9	75.0	12.1	6.57	.0126*

* Significant at the alpha .05 level.

Table 4.

Comparisons of Mean Attitude Scores of Workshop Participants

	Pre	Post	F value	P value < F
Mean*	4.37	4.49	0.32	0.5922

* Scale range = 1-7 from most negative to most positive.

Relationship Among Demographics and Change in Knowledge and/or Attitude

Correlation coefficients were calculated to determine if any relationships existed between variables such as respondent characteristics, score on knowledge assessments and attitude assessments. The only relationship above the "low" classification was the "moderate" relationship between posttest scores and age (-.33440).

Conclusions

Conclusions were determined based on major findings of this study.

1. The typical individual attending the Basic Training workshop was middle aged, male, and well educated.
2. The short-term small business training workshops did significantly increase the knowledge of individuals attending the workshop.
3. The small business training workshop did not alter the overall attitude of an individual toward starting a small business.
4. Personal and/or professional characteristics did not have an impact upon the overall change in knowledge and/or attitude of the workshop participants.

Recommendations

The ensuing recommendations were based on the results, inferences, and insight gained through conducting the study.

1. Because the typical respondent falls within narrow limits in terms of diversity, educational programs presented by the Oklahoma Food and Agricultural Products Center should be targeted to reach underrepresented groups.
2. To aid in reaching a more diverse audience, alternative delivery modes should be explored. Possible delivery methods could include videotapes, Internet, videostreaming, satellite, and/or individualized instruction.
3. The "Basic Training" short-term workshop is supportive of the Center's mission to educate their clientele. Therefore, the workshops should be continued.
4. The findings point to the fact that short-term workshops do not provide sufficient time to alter or change an individual's attitude toward establishing a small business. It should be considered that perhaps prior to workshop participation individuals have misconceptions about starting a small business and as a result of participating in the workshop come to realize the effort required in the development of a small business.

The following issues should be addressed in future research:

1. To aide in the Oklahoma Food and Agricultural Products Center's mission of continually providing quality educational programming to meet the needs of their audience, every educational program delivered by FAPC staff should be evaluated to determine its impact upon participants' knowledge, attitudes and skill development.
2. Research should be conducted to determine the effects of length of time of workshop sessions on individuals' change in attitude. Due to the fact that a short-term educational workshop was not a sufficient period to change an individual's attitude, research comparing short-term workshops to extended workshops should be conducted.
3. In addition to the six demographic questions that were included in this study, it would be worthwhile to examine other characteristics, such as: The number of business-related courses participants had taken; From where participants were traveling to attend the workshop; and, How many participants had family members who owned a small business.
4. A follow-up questionnaire should be mailed to workshop participants six months after the session to determine how much knowledge was retained and how much individual attitudes had changed overtime.
5. It would be beneficial to conduct a similar study with other workshops presented by the Oklahoma Food and Agricultural Products Center for access to a larger, more diverse group of respondents.

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Evaluation of a Workshop for Agricultural Entrepreneurs

A Critique

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Providers of adult education have long utilized short-term workshops as a means to deliver programs for adults in agriculture. The purpose of this study was to assess the impact of a series of short-term, small business workshops delivered at the Food and Agricultural Products Center by assessing the change in knowledge and attitudes of workshop participants and determining if relationships exist between the characteristics of workshop participants and their change in knowledge and/or attitude.

The authors developed an excellent introduction and theoretical framework for this study. The mission of the FAPC was to provide educational programs that support value-added food and agricultural products processing in Oklahoma. Assessment of the change in knowledge and/or attitudes of participants as a result of these educational programs is important if the FAPC is to achieve its mission.

The results indicated that there were changes in the knowledge of the participants as a result of the workshops. The authors compared pretest and posttest scores using analysis of variance procedures. One might ask why this was necessary when this was a census or population study. Would it be more appropriate to just report the differences in mean scores and let the reader draw their own conclusions?

The workshop was four and one half hours in length. Comparisons of pretest and posttest mean attitude scores revealed no significant differences. The authors correctly identify the fact that short-term workshops do not provide sufficient time to alter or change participants attitudes. Knowing this ahead of time, one might ask why some other measure such as a follow-up questionnaire mailed six months after the session (as identified by the authors in the issues to be addressed in future research) was not utilized and reported in this study?

The authors are to be commended for including issues that should be addressed in future research. They indicated that every program delivered by FAPC staff should be evaluated to determine its impact upon participants. They identified length of time as an issue to continue to be explored. The authors also identify additional demographic data that should be collected and examined to determine if relationships exist between the variables and participants knowledge and attitude assessments. This is extremely beneficial to other researchers and indicates a research focus for the authors.

Predictors of FFA Program Quality

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Oliver (1991), vice president of DowElanco Ltd., said that agribusiness was in desperate need of leaders with vision. He asserted that agribusiness had learned about management but needed leadership. Hildreth (1991), with the Farm Foundation, echoed Oliver by saying the need for leaders is large and growing, especially in the field of agriculture. Merritt (1984) chaired a task force that identified and ranked twelve areas of high priority in undergraduate education in agricultural sciences. One of the deficiency areas identified by Merritt's group was leadership. Simply stated, agricultural students need more emphasis on leadership.

Those of us associated with the FFA have contended the FFA is part of the solution to the leadership crisis in agriculture. FFA has been recognized by leaders of business, industry and education as an organization that provides leadership development for youth (Hoyt and Storms, 1988). Barrett (1983) asserted that the FFA and other rural youth development programs have had a significant impact on students by emphasizing leadership development. After studying educational reform efforts, Rosenfeld (1983) concluded that agricultural education was the model for educational reform, partially because of the emphasis on the leadership development component (FFA) of the program.

There has been considerable empirical research in agricultural education regarding leadership development and the FFA (Brannon and Key, 1989; Brick, 1998; Briers and Fraze, 1987; Carter and Gamon, 1987; Carter and Townsend, 1983; Newcomb and Ricketts, 1984; Townsend, 1981; Wingenbach and Kahler, 1997). The findings of the research generally indicate that participation in FFA activities does enhance leadership skills and helps students succeed in their chosen occupations.

A critical element in leadership development is the FFA advisor (agricultural education instructor). Barrett (1983) asserted that a teacher with practical knowledge of leadership theory, group dynamics, advanced teaching methods and knowledge of the agricultural setting will provide a successful environment to learn about leadership development. The literature (Bell, 1996; Dodson and Townsend, 1996; Fritz, 1996; Gliem and Gliem, 1999; Townsend, 1999; Vaughn, 1976) indicates the teacher is the key to leadership development. The FFA advisor is the one who motivates, inspires and teaches leadership skills to FFA members. It would be logical to assume that FFA advisors who have more leadership training and experience would do a better job of developing leadership skills in FFA members. This in turn would result in a higher quality FFA program in the local chapter.

Newcomb and Ricketts (1984) suggested research be conducted to determine the leadership and personal development abilities of FFA advisors. They also recommended that a study be conducted to determine what variables superior chapters have that result in higher leadership development abilities in students. The research presented in this paper builds upon the recommendations of Newcomb and Ricketts.

Purpose/Objective

The primary purpose of this study was to identify the predictors of a quality FFA program in North Carolina. More specifically the researcher wanted to determine if the leadership training and experience of agriculture teachers were predictors of quality FFA programs. The research question was, "What are the predictors of a quality FFA program?"

It was hypothesized that the leadership experiences and the leadership training of the teacher would be the primary determinants of FFA program quality.

Theoretical Framework

Kolb's Theory of Experiential Learning coupled with the previous research on the role of the agriculture teacher in leadership development provided the theoretical foundation for this study.

In Kolb's Theory of Experiential Learning the starting point for learning is **concrete experience**. Learners need to experience the concept to be mastered. In this research, the past leadership experiences of the teacher fits this component of the model.

Critical Reflection or Critical Observation is the second step in Kolb's theory. The individual has to think about and reflect on their experiences. In this research study, the second step is equated to the formal course work in leadership the teacher has experienced. The agriculture teacher is formally taught leadership concepts in his/her teacher preparation program and is encouraged to compare and contrast this with his or her concrete leadership experiences.

Abstract Conceptualization is the third component of Kolb's model. Agriculture teachers think about how they will teach leadership to their students. This is a result of their experiences and reflection.

Active Experimentation is the final formal stage in Kolb's model. The learner implements what has been learned and tests this skill or knowledge in the crucible of the real world. In this study, the development of leadership skills on the part of the student through participation in FFA activities reflects the active experimentation stage of the model. As illustrated in the diagram below, the success or failure of the active experimentation (operation of the FFA chapter) leads to further critical reflection and the process continues.

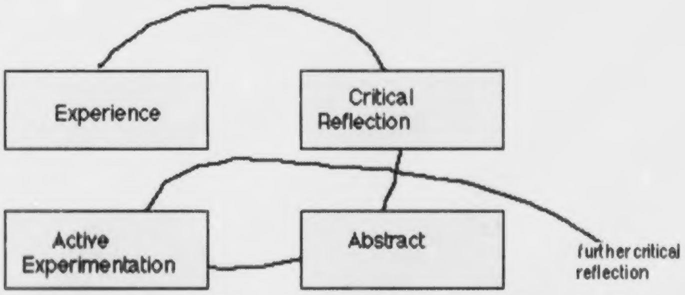

Figure 1 - Kolb's Theory of Experiential Learning

Based upon Kolb's model, as the level of leadership experiences and leadership training of the teacher increases, the likelihood of having a high quality FFA program should also increase. This should result in enhanced leadership skills on the part of the students.

Methods and Procedures

Research Design

A descriptive research design was used in this study. Descriptive research is a type of quantitative research (Borg and Gall, 1996). Survey research was used because it is an effective method to obtain data from a large number of people (Borg and Gall, 1996). This method was used to collect information about agricultural education teachers and FFA programs in North Carolina. A questionnaire was administered that asked the same questions to each research participant. This was to ensure that the data obtained was standardized.

The study was ex post facto in design, meaning "after the fact". Kerlinger (1973) identified three weaknesses of ex post facto research: 1) the inability to manipulate independent variables; 2) the inability to use randomization to control extraneous variables and 3) the danger of improper interpretation of results. Kerlinger (1973) suggests two possible methods for controlling extraneous variables in ex post facto research: 1) testing alternative hypothesis and 2) multiple regression analysis. In this study, stepwise multiple regression analysis was used.

Population

The population for this study was 212 FFA advisors of 212 FFA programs located in senior high schools (grades 9-12) in North Carolina. A study of the entire population was conducted. In multiple teacher departments, the teacher with the most years of teaching experience completed the instrument.

Instrumentation

The primary instrument used in the study was modeled after an instrument designed by Asiabaka (1984). Asiabaka (1984) developed an instrument to measure agricultural education program quality as part of his doctoral dissertation at Louisiana State University. In developing the original instrument, Asiabaka (1984) had a panel of 10 nationally recognized authorities in agricultural education validate the instrument. The original instrument had a reliability score of .85.

For this study, the FFA "program quality" section of Asiabaka's (1984) instrument was used. Modifications were made to reflect changes in the FFA. For example, items related to BOAC and other defunct programs were removed. They were replaced with items on new FFA programs such as the agriscience fair. The instrument was prepared in booklet format according to the Total Design Method (TDM) developed by Dillman (1978). The reliability of the modified instrument was .75.

Field Test

A field test of the instrument was conducted in Virginia. A number of questions were modified as a result of the field-test and the placement of some items was changed. It was also decided to omit the "Perceptions of the FFA" section because of low reliability.

Data Collection

Data were collected using two separate types of collection procedures. First, data were collected from agriculture teachers in North Carolina who attended inservice workshops during the month of March, 2000. A total of 101 teachers representing as many programs responded during this first collection method. Second, a mailing to all senior FFA advisors from agricultural education programs who had not attended the inservice meeting or who had not responded was sent after the meetings. A total of 43 teachers representing as many programs returned the questionnaire in the allotted time period. Thirteen questionnaires were received after the deadline. Counting all responses the total response rate was 74%. The researcher compared the early respondents with the late responders based upon the convention of Miller and Smith (1983) who assert that late responders are representative of non-responders. No significant difference between the two groups was found. Therefore, all data were combined and no additional follow-up was conducted.

Analysis of Data

Data were analyzed using SPSS for Windows 9.0. Simple frequencies and descriptive statistics were used to describe the demographic data. Using Kerlinger's suggestions, stepwise multiple regression was used to identify predictors of FFA program quality.

In addition to demographic information, the instrument yielded two summated scores. These two summated scores were an FFA program quality score and a teacher leadership experience score. The design of the study called for the compilation of a leadership training score. When the data were analyzed, it became apparent that the teachers had difficulty in remembering and reporting their formal leadership training hours. If the data the teachers reported had been analyzed, the results would be suspect. Therefore, a leadership training score was not included in the data analysis. It is possible that this could have been a predictor of FFA program quality.

A multiple regression analysis was conducted in order to determine the predictors of a quality FFA program.

Results/Findings

Demographic Data

Of the 157 teachers who responded, the years of teaching experience ranged from .5 to 35 years with a mean of 14.58 years. The mean number of teachers in a department was 1.47. Ninety departments reported having one teacher, 49 reported having two teachers, 9 reported having three teachers and 1 reported having three and one half teachers. The contract length ranged from 7 to 12 months with a mean of 11.84 months. The majority of teachers, 65.6%, had 12 months employment, .5% (one) held a 7 month contract, 2.8% had a10 month contract, 3.8% (eight) had an 11 month contract and .5% (one) held an 11.5 month contract. Only 10 teachers taught classes other than agriculture. Thirteen teachers also coached.

One hundred thirteen teachers possessed an undergraduate degree in agricultural education and 44 did not. Forty-three teachers were lateral entry teachers. Seventy-six (49 percent) teachers held a masters degree.

The mean number of students enrolled in agricultural education per program was 125.24. The range was 10-320. Of the students enrolled in agricultural education, the mean percentage of males was 70.31 and the mean percentage of females was 29.69. The mean percentage of rural students enrolled in agricultural education was 65.35 and the mean percentage of non-rural students was 34.65. The mean percentage of students who were FFA members was 67.16.

Seventy-eight programs reported having an advisory committee while 79 programs did not have an advisory committee. Forty-nine programs had an FFA Alumni.

Leadership Experience

The leadership experience of the teachers in North Carolina was examined. The number of organizations belonged to and the number of offices held were summed to give a leadership experience score. The items that made up this variable were high school FFA membership of the teacher, FFA offices held by the teacher, high school leadership organizations other than FFA, offices held in high school leadership organizations other than FFA, collegiate leadership organizations and offices held in collegiate organizations, professional education organizations and offices held, civic organizations and offices held, professional development organizations and offices held, other groups and organizations and offices held, regional/state agricultural education committees served on, workshops and training seminars conducted, high school leadership positions and number held and the number of time attending the Advisors Washington Leadership Conference. Table 1 shows a sampling of the items including in compiling the leadership experience score.

A leadership experience score was calculated for each responder. The mean leadership experience score was 23.90. The standard deviation was 14.82.

Leadership Training

The respondents were asked about their leadership training in college. The researcher planned to calculate a leadership training score. However, a close inspection of the data indicated that some teachers reported clock hours of training (what the instructions asked for), some credit hours of training, and some didn't remember. Because of the unreliability of the data provided by the teachers, it was reluctantly decided to omit this factor from the data analysis.

Table 1
Teacher Leadership Experiences

Organization Type	Members / Yes N	Non-Members/ No N	Held Office N
FFA Membership in High School	115	42	98
FFA District/Regional/State Office	-	-	47
Non-FFA Organizations in High School	137	20	98
Collegiate Organization Membership	125	32	80
Professional Education Organizations	143	14	56
Civic Organization Membership	76	81	67
Served on State or Regional AgEd Committees	112	45	-
Conducted Ag. Ed. Workshops/Seminars	65	92	-
Vocational Leadership Position in School	101	56	-
Attended Advisors Washington Leadership Conference	15	142	-

Predictors of FFA Program Quality

Thirty-nine items were used to develop a FFA program quality score. Various activities in which FFA chapters are expected to participate were listed and weighted according to criteria used by Asiabaka (1984). A program quality score was calculated for each chapter. Some of the items included in the FFA program quality score were number of FFA meetings held annually, national chapter rating, percent of FFA membership, participation in career development events, number of state degree recipients, and number of proficiency award applications. The mean quality score was 61.34 with a standard deviation of 32.58. The range of quality scores was 3.25-172.10. Selected variables used in calculating the FFA program quality score are presented in Table 2.

A stepwise multiple regression analysis was conducted in order to identify the predictors of a quality FFA program. The dependent variable was FFA program quality. The review of literature provided the background for selecting the variables to enter into the regression formula. The variables entered into the multiple regression analysis were years of teaching experience, number of teachers in the department, number of students in the program, teacher's contract length, leadership experience score (a composite variable), student gender, and the percentage of rural and non-rural students. The model that emerged consisted of two variables that explained 36 percent of the variance. The two variables were the number of teachers in the local department and the teachers' leadership experience.

Table 2
Selected FFA Program Quality Variables.

Variable	% Chapters	M	SD
Local CDE Competitions are Held	75.2	-	.43
Chapter Participates in CDE Events above the Local Level	84.1	-	13.62
Held Regular FFA Meetings	93.0	-	5.15
Official FFA Ceremonies used in Meetings	73.2	-	.44
Officers Recite FFA Ceremonies from Memory	79.0	-	.39
Chapter has a Written POA	55.4	-	.50
Speakers/Formal Programs at meetings last year	35.0	1.04	1.78
Annual FFA Banquet held	64.3	-	.48
Participates in National FFA Week Activities	72.6	-	.45
Chapter Star Greenhand Pin is Awarded	68.8	-	.46
Chapter Members Receive State FFA Degrees	40.1	2.11	3.42
Agriscience Fair Participation	3.8	-	.43
NC Superior Chapter Rating Received	17.8	-	.38
National Rating Received	4.5	-	.41
Awarded Local Proficiency Awards	49.0	5.15	8.13
Regional CDE Teams last year	77.7	3.75	3.53
NC FFA Convention Attendance	65.6	6.56	7.20
Food for America Program Participation	16.6	-	.37

The number of teachers in the department explained 27 percent of the variance alone. When the teacher's leadership experience score was added, 36 percent of the variance was explained. The results of the stepwise multiple regression analysis are summarized in Table 3.

Table 3
Predictors of FFA Program Quality Multiple Regression Analysis.

Variable	R	R Squared	R Squared Change	Sig. F Change
Number of teachers per department	.52	.27	.27	.001
Teacher's leadership experience	.60	.36	.09	.001

The leadership experience of the teacher was a composite score. Since this score was derived from numerous items, those items were entered into a stepwise multiple regression analysis in order to identify the significant items within the composite variable. Five items emerged from this analysis. They were regional/state agricultural education committees served on, regional/district/state FFA office held by the teacher while a student, leadership positions held in the high school vocational department, the number of times the teacher attended the Advisors Washington Leadership Conference Program and the number of offices held in student leadership organizations other than FFA while in high school.

Conclusions/Recommendations/Implications

The first conclusion of this study is that in general, multiple teacher departments have higher quality FFA programs. In this case, research supports common sense. The more teachers in the department the higher the FFA program quality. Common sense tends to support the theory that more things can be accomplished through more people. This conclusion is supported by Straquadine (1988) who found that that the higher the number of teachers in the department, the higher the program quality.

The first implication is that if school systems want a higher quality FFA program they should strive to increase the number of teachers in the department. The second implication is that teachers in single teacher departments could use as much help as possible in efforts to have a quality FFA program. Single teacher departments should consider resources such as having an active FFA alumni and/or an active advisory committee. An active alumni chapter can decrease the total workload of the teacher by helping prepare CDE teams, driving students to events and helping the FFA program raise money. An active advisory committee can assist the teacher in recruitment efforts and developing a program of activities thereby reducing the workload in single teacher departments.

The National FFA should consider providing more resources through the Internet or on CD-ROMs. While all teachers would benefit from this, this would be particularly valuable for teachers in single teacher departments. For example, providing lesson plans, PowerPoint presentations and examples of completed applications would be valuable resources that National FFA could provide.

The second conclusion of this study was that the leadership experiences of the teacher have a positive influence on FFA program quality. Teachers who serve on regional/state agricultural education committees, held regional/district/state FFA office while in high school, hold leadership positions in the high school vocational department, attended the Advisors Washington Leadership Conference Program and held office in student leadership organizations other than FFA while in high school had higher quality FFA programs.

The fact that leadership experiences emerged as a predictor of FFA program quality gives credence to the use of Kolb's Theory of Experiential Learning as part of the theoretical model for this research.

The number of regional/state agricultural education committees a teacher served on was associated with FFA program quality. It could be that teachers who have strong programs or asked to serve on regional or state committees. However, it is also possible that teachers who participate on these committees may become aware of the newest information through contact with peers and partners during these meetings. The teacher then uses this information to improve his/her FFA programs. One implication of this finding is that teachers who want to improve their FFA program quality should volunteer to serve on committees.

If the teacher held a regional/district/state FFA office while in high school, he or she had higher FFA program quality scores. In this study, just being an FFA member was not a predictor of FFA program quality. This is supported by Vaughn's (1976) study, which said that the participation in FFA as a student did not affect the degree of success the teacher had. Individuals who held an elected FFA office above the chapter level had higher FFA program quality scores. The implication is that we should actively recruit regional/district and state FFA officers into agricultural education teacher preparation programs.

The number of leadership positions the teacher held in the local vocational department was another indicator of FFA program quality. If a teacher is an active leader in the local school, it stands to reason that the teacher would be an active leader of his or her FFA program. The implication is that teachers who are involved in leadership positions in their school are likely to be more active in strengthening their FFA program.

The number of times the teacher attended the Washington Leadership Conference for advisors was associated with FFA program quality. The leadership conference is a nationally sponsored conference developed especially for advisors. This provides a unique inservice opportunity to strengthen teacher leadership skills. The implication is that more advisors should attend the Washington Leadership Conference for Advisors. This supports the research conducted by White (1982) that determined that more in-service activities for advisors should be held to teach leadership and leadership training skills.

The number of offices held in high school leadership organizations other than the FFA was also associated with FFA program quality. Perhaps FFA does not have a monopoly on leadership training. High school students who plan to be agricultural teachers should not be discouraged from being officers in other youth organizations. This will help them in the future.

The hypothesis of this study was that the teacher's training and experiences related to leadership were predictors of a quality FFA program. Because of instrumentation problems, the researcher was not able to test the "training" component of the hypothesis The stepwise multiple regression analysis showed the teachers' leadership experience score to be a determinant of a quality FFA program. The findings partially support the hypothesis and supports Cronin's (1984) claim that leaders are made through exposure to leadership and not born.

Additional Thoughts

In conclusion, the programs that were shown to be of higher quality were those that had multiple teachers and those that had teachers with more leadership experience. An unexpected finding of the study that surprised the researcher was the overall low FFA program quality scores. Many chapters simply are not doing what leaders in the field believe quality FFA programs should be doing. For example, the number of chapters using the official opening and closing ceremonies at chapter FFA meetings was lower than expected. The number of FFA programs that had speakers/formal programs last year at meetings was 36.9 percent and of those, they only averaged 1.04 speakers per year. Only 55.4 percent of the FFA programs in North Carolina had a written program of activities. These variables along with several others are at a level that is less than acceptable.

Because of problems in calculating leadership training scores in this study, additional research should be conducted to determine if the formal leadership training experienced by teachers in their teaching training program is a predictor of FFA program quality.

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Predictors of FFA Program Quality

A Critique

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Contribution and Significance of Research

The literature cited by the authors lays a thorough theoretical base for this study on the importance of the FFA in leadership development and the critical role of the instructor. Kolb's Theory of Experiential Learning was used as the linchpin between the concrete leadership experience of the advisor and the active experimentation of the students practicing leadership through the FFA. This reviewer thought the study would also be informed by Bandura's social learning model with special attention given to his concepts of modeling. Students would adopt those leadership practices used by effective models. The efficacy of the agriscience instructor as a model would be based on many of the variables examined in this study.

Procedural Considerations

The methods and procedures section did a good job of describing the research design, population and sampling procedures. The population is described as the 212 advisors in North Carolina. A census of this population was taken. Is this truly the population of interest?

Instruments developed for this study were constructed following recognized procedures to ensure content validity and instrumental reliability. The researchers are to be commended for doing an excellent job. Few of our studies complete field tests. Data collection and data analysis were completed following recognized procedures.

The authors will want to appropriately limit the conclusions/implications to the population of interest, apparently the 212 North Carolina programs. The number of teachers is clearly related to a higher program quality score. This reviewer questions whether or not to attribute causation to the variable. How much of that variance might be explained by higher student numbers (almost certainly related to teacher numbers). Attendance at the Washington Leadership conference and the number of leadership positions held outside the vocational program were related to a higher program quality score. Here again causation may be difficult to support.

Questions for Consideration

The leadership experiences of the instructors were related to a higher quality score. Teachers with more frequent participation in leadership programs direct higher quality FFA programs. This has implications for practice among teachers and teacher education programs. What should we do with this information?

The authors point out that many programs were not performing the activities required in the program quality index at an acceptable level. What can we do with this information?

The Image Factor: Perceptions Of The FFA Organization By Members And Non-Members

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Abstract

The purpose of the study is to determine if there is a difference between FFA members and non-members as to their perception of the overall image of the FFA, and to determine if students' perceptions of the image of the FFA are influenced by gender and ethnicity, enrollment choice, prior enrollment in an agriculture class, block scheduling, grade level and extracurricular activities.

Data were collected using a questionnaire administered to 404 students enrolled in the Agriscience Applications course in 27 schools in North Carolina. Of the students surveyed, 404 returned useable responses. The data were collected by on-site school visits by the researcher. Data were analyzed using multivariate analyses of variance, one-way analyses of variance, and descriptive statistics. It can be concluded that: A student's decision to join or not join the FFA is influenced by their perception of the image of FFA in their school. A student's gender, ethnicity, enrollment choice, prior enrollment in an agriculture class, block scheduling, grade level and extracurricular activities do not influence their perceptions of the FFA organization's image.

The implications are significant for the FFA and agricultural education in that students tend to join and participate in the FFA based upon the organization's ability to meet a student's need for a sense of belonging. The FFA should continue to seek ways to involve all members in positive personal growth activities that allow students to experience that sense of belonging. Based upon the responses of members, the social aspects of the organization were motivating factors in their desire to be members. However, the students today are not necessarily interested in some of the traditions of the FFA.

One traditional method that the FFA uses to encourage students to feel as if they belonged as members of the organization is through the use of the FFA jacket. Based upon this research, both FFA members and non-members hold a less than favorable opinion of the FFA jacket today. The FFA may need to work toward providing more sophisticated methods of instilling that sense of belonging and comradeship that the FFA has enjoyed in its long history. Agriculture teachers should not necessarily rely on traditional methods for recruiting and retaining members in the FFA as these methods will not necessarily bring students into FFA membership today. Agriculture teachers should appreciate the traditions of their profession, and use these traditions as motivators to teach effectively within the context of today's agriculture classroom. Modern recruiting methods should be developed that capitalize on the favorable impression created by the FFA organization's image.

Introduction

The National FFA Organization spends more than $7 million dollars annually to maintain existing programs and develop new programs for its membership (National FFA Foundation, 1997). In North Carolina, the state FFA association spends more than three hundred thousand dollars each year on career development events and leadership programs. An effort is made each year to create a relevant and service-oriented FFA organization in North Carolina. After three years of concerted effort from 1995 to 1998 to improve services to members, total membership did not increase. In 1998, approximately 16,000 students said "no" to the activities, programs and services of the North Carolina FFA Association (NCDPI, 1995).

The image of the FFA is defined as the mental picture that forms when certain characteristics about the FFA are brought to one's attention. This image can be either positive or negative and can be based upon known facts or supposition (The American Heritage College Dictionary, 1993). The value of the any member-based organization resides essentially in the minds of its members. Part of the value can be traced to tangible items such as a magazine subscription or a leadership manual while the remainder of the value of membership is found in intangible things such as sense of belonging or a feeling of pride by association with the organization (Sirkin and McDermott, 1995). If the organization has a positive image and provides members with a sense that their lives are more satisfying as a result of the association with the organization, then membership recruitment and retention is significantly easier (Sirkin and McDermott, 1995). The question arises as to whether agricultural education students have a positive perception of the FFA organization. Furthermore, are there social and demographic factors that are influencing a student's perception of the FFA's image?

Maslow introduced the concept of self-actualization in his book, Motivation and Personality. Maslow believed that the human individual is an integrated organism. It is impossible to separate the various components of a person's self. When an individual experiences hunger, it is their whole self that is hungry and not just selected physiological components. It is the whole person that has the desire for food, shelter and safety.

Maslow's theory rests upon the idea that an individual progresses through a series of stages during their lifetime. The stages are generally identified as physiological and safety needs, esteem needs, cognitive and aesthetic needs, and self-actualization. Even if all of the other needs are met, the individual will develop a sense of restlessness and discontentment unless he or she is accomplishing goals true to oneself (Maslow, 1970). Maslow suggested that an individual progresses through this hierarchy in the order described. However, the order may be rearranged as a result of an individual's experiences. By suggesting this, Maslow recognized the biological and social bases of human motivation (Weiten, 1989).

Maslow's Hierarchy is relevant to this study in that it offers a basis for understanding potential reasons why students join and participate in youth organizations. If students are motivated by a sense of belonging, a desire for status, and a need to feel important, then this theory may explain why students tend to join and participate in the FFA organization.

In a study of 1121 rural and urban high school students in Indiana and Michigan, Frick, Birkenholz, Gardner and Machtmes (1995) found that students held a positive view of agriculture, even though they were not members of the FFA.

Scanlon, Yoder, Hoover and Johnson (1989) found that the top recruiting practices perceived to be most effective by teachers were participation in career development events, FFA activities and awards programs. Teachers also perceive personal contacts with prospective students by current students and recruitment presentations made to eighth graders as valuable recruiting tools. Scanlon, Yoder, Hoover and Johnson (1989) also found that eleventh grade FFA members reported that the development of leadership skills, the variety of local and state education activities, and the communication skills developed through FFA activities were the most common perceptions attributing to their decision to join the FFA. Among eleventh grade students who were not FFA members, the most common perceptions were that FFA activities were not interesting, take too much time out of school and interfere with other activities. The non-members also believe that they do not fit in with the farmer-type image projected by their high school agricultural education program.

Sutphin and Newsom-Stewart (1995) found that students held an overall perception that activity-centered learning, opportunities for work experience, and teamwork and life skills were valuable and good reasons for enrolling in agricultural education courses. The study also found that no significant ethnic difference existed in the students' decisions to study agriculturally related courses with respect to preparation for jobs and higher education, social and development skills, peer pressure, enhancement of academic skills, and the activity-centered nature of agricultural education courses (Sutphin, Newsom-Stewart).

One major educational reform initiative is the implementation of block scheduling in high schools. In a study involving 142 agricultural education programs in North Carolina, Becton (1996) found that teachers believed that block scheduling has a deleterious effect on FFA member recruitment and retention. Furthermore, block scheduling was perceived to have little impact on classroom instruction or supervised agricultural experience. Communication between teachers and students not currently enrolled in agriculture classes was identified as a major problem. Wortman (1997) found that students who did not serve in official leadership positions in the local FFA chapter had no significant positive or negative perception regarding block scheduling and is impact on FFA activities. Students who served as FFA officers reported that block scheduling negatively influenced student participation in FFA activities.

Talbert and Larke (1995) found that minority students, especially minority females were underrepresented in agricultural education. Also, minority students had more negative perceptions about agriculture than non-minority students did. With regard to FFA participation, minority students have fewer role models. They reported that minority students saw themselves as unlikely candidates for careers in the agriculture industry.

In North Carolina, the Latino population has risen significantly over the last eight years. The number of Latinos enrolled in North Carolina schools has risen an average of 285% in the last eight years. Factors identified as critical challenges to involving Hispanic students in FFA activities were the lack of role models in agricultural education for Hispanic youth, the absence of FFA promotional and instructional materials prepared in the Spanish language, and the unavailability of agricultural education teachers that can speak Spanish fluently in order to communicate with students (Martinez, 1998).

Purpose

The purpose of the study was to determine:

1. If there a difference between FFA members and non-members as to their perception of the overall image of the FFA.
2. Are students' perceptions of the image of the FFA influenced by gender, ethnicity and FFA membership status?
3. Are students' perceptions of the image of the FFA influenced by enrollment choice, prior enrollment in an agriculture class and FFA membership status?
4. Are students' perceptions of the image of the FFA influenced by block scheduling and FFA membership status?
5. Is there a relationship between a student's grade level and their perceptions of the image of the FFA?
6. Is there a relationship between the number of clubs and formal athletic activities in which a student participates and their perceptions of the image of the FFA?

Methods

The population for this study is first year students of agricultural education who were enrolled in the Agriscience Applications course in North Carolina schools. This was the first opportunity that most students should have had to join the FFA organization. Four hundred and four students were selected for the study based upon the geographic region in which their school is located. Schools selected for this study all had FFA chapters and were categorized as having 33% or less FFA membership, 34-66% membership, or 67-99% membership. An equal number of schools were selected in each membership percentage category.

Because this is descriptive research, a questionnaire was developed based upon a series of FFA program characteristics. Participants were asked to respond by indicating their agreement with a series of 18 statements regarding the image of the FFA. The response choices and their numerical values are as follows: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1, and Do Not Know = 0. The midpoint of this scale was 2.5, and all mean scores above this number were interpreted be in agreement with the item. All mean scores below 2.5 were considered to be in disagreement with the item and items with a mean score of 2.5 were interpreted to represent a neutral opinion. The scaled items were derived from the objectives of the FFA Local Program Success Model (National FFA Organization, 1997a). The Local Program Success Model was created and developed by experts in agricultural education for the purpose of improving local agricultural education programs. The researcher's graduate advisory committee, as a panel of experts in agricultural education and FFA, identified additional items to be included in the survey instrument and modified some items derived from the Local Program Success Model. The instrument was field tested and yielded a Cronbach's Alpha score of 0.88 as a measure of internal consistency of the instrument.

The data were collected and tabulated using Microsoft Excel® and transferred to the Statistical Package for Social Sciences (SPSS) 8.0.0® for Windows®. The first procedure involved an analysis of descriptive statistics in order to have a clear profile of the sample.

Descriptive statistics were generated for gender, ethnicity, grade level, prior enrollment, enrollment choice, block schedule characteristics of the school, FFA membership status, and number of clubs in which survey respondents were members.

The next procedure involved an analysis of the first research question. A multivariate analysis was used to examine the 18 image items simultaneously. If differences were determined to exist between FFA member and non-member perceptions, one-way analyses of variance determined which items accounted for the overall differences. A multivariate analysis of variance test was performed to determine if students' perceptions of the FFA image were influenced by selected demographic and school characteristics as described in research questions two through four. For those multivariate analyses that yielded significant differences in the main effects of independent variables, a one-way analysis of variance was performed to pinpoint any significant differences.

Prior to any multivariate analyses, the dependent variables were compared using the Pearson Product Moment Correlation statistic to determine if a significant correlation existed between the scaled items on the survey instrument. Hotelling's Trace was the statistic used to determine the level of significance in each multivariate analysis. In addition, the Pearson Product Moment Correlation statistic was used to answer research question five by determining if a relationship existed between the grade level of students and the students' perception of the FFA image and question six by determining if a relationship existed between the number of clubs in which students were members and their perceptions of the FFA image.

Results

The majority of study participants were males, constituting 76 % of the data sample. In all, there were 308 males and 96 females in the data sample. Females comprised 22.6 % of the members and 24.5 % of the non-members in the study. Of all participants in the study, 41.5 % indicated that they were FFA members and 58.5 % were non-members. Two hundred ninety nine Caucasian students and 102 non-Caucasian students participated in the study. Because of the low numbers of certain ethnic groups in the sample population, all ethnic groups except Caucasian were combined for data analysis. Freshmen made up 51.7 % of the students in the survey while seniors were the fewest number of students in the sample, comprising only 5.7 % of the sample. With respect to club participation, 34% of respondents indicated that they were not members of any club or school organization and did not participate in any kind of extracurricular athletic sport. This constituted the largest number of responses in the sample. More FFA members participated in clubs and athletic activities than non-members. Participants in the study were also asked to provide data regarding their choices in signing up for Agriscience Applications. The majority of students reported that they signed up for the class by their own free will and that this was their first agriculture class. Eighty-nine percent of the students in this study report that their school is on a block schedule system.

A multivariate analysis was performed using as the dependent variables the items on the instrument designed to measure students' opinions of the FFA organization's image. The independent variable was FFA membership status. This analysis yielded a Hotelling's Trace value of 0.379 ($\underline{p}<.05$). Therefore, a significant difference exists between FFA members and non-members with regard to their opinions of the FFA organization's image. Table 1 represents the results of the analysis of data gathered from survey respondents as to their opinion of the overall image of the FFA.

FFA members reported higher mean scores than non-members for every image item. Both members and non-members agreed that the FFA is not just for those students who wish to become farmers. Members generated a mean score of 3.29 (SD=0.75) and non-members generated a mean score of 3.12 (SD=0.71) for this item. Members also rated highly the item that the FFA is for all students not just an elite few (M=3.25, SD=0.82). Members indicated that they were familiar with the FFA prior to signing up for the agriculture course (M=3.10, SD=0.65). The FFA members in the study indicated that they thought that the FFA was a "cool" organization and would join the FFA in future years if given the chance (M=3.13, SD=0.66). They also indicated that the FFA at their school had a great image (M=3.07, SD=0.77). FFA members had received a lot of information about the FFA (M=3.24, SD=0.66). Members indicated that the FFA advisor and their parents had encouraged them to join the FFA and that many of their friends were members of the FFA organization. The FFA advisor scored higher than parents or friends as recruiters for the FFA (M=3.14, SD=0.77).

FFA members in the study indicated that being in the FFA was cost effective, considering the amount of FFA activities available to them and the cost of participation in these activities (M=3.07, SD=0.81). FFA members indicated that participation in the FFA was worth at least the cost of the membership dues (M=3.21, SD=0.77). Overall, FFA members rated the FFA as an organization that has a positive influence on their social standing in school, that many of their friends are involved in the organization, and that FFA members are people who treat others with kindness and respect. FFA members did not entirely agree with all items regarding the FFA organization's image. The members in the study indicated that they did not like the official FFA jacket (M=2.40, SD=0.94).

Non-members agreed that they knew about the FFA before signing up for the agriculture class (M=2.67, SD = 0.88) and that they had been provided with a lot of information about the FFA (M=2.80, SD=0.82). Non-members also indicated that the FFA had a great image at their school (M=2.71, SD=0.88). Furthermore, non-members reported that the local FFA chapter had many FFA activities (M=2.70, SD=0.85) and that these activities were for all students regardless of their ethnicity (M=3.25, SD=0.68). On average, both FFA members and non-members agreed that the FFA was an organization open to students of both genders and all ethnic groups. Non-members also indicated that joining the FFA was cost effective (M=2.66, SD=0.84).

With regard to recruiting practices, non-members indicated that their FFA advisor encouraged them to join the FFA organization (M=2.73, SD=0.83) and that the local FFA chapter has many activities in which members can participate (M=2.70, SD=0.85). Non-members reported that most of their friends were not FFA members (M=2.22, SD=0.91) and non-members agreed with FFA members in their dislike of the FFA jacket (M=1.97, SD=0.93).

Table 1
Perceptions of Members and Non-Members of the Overall Image of the FFA.

FFA Image Items	Members (n=167)		Non-Members (n=237)		F
	Mean	Std. Dev.	Mean	Std. Dev.	
The FFA has activities for all students regardless of whether they are male or female.	3.45	0.56	3.41	2.23	0.06
The FFA has activities for all students regardless of race.	3.41	0.66	3.25	0.68	5.03*
I would join the FFA in the future if given the chance.	3.29	0.75	2.42	0.95	80.96*
The FFA is only for students who want to be farmers.	3.29	0.75	3.12	0.71	4.71*
The FFA is for all students in my agriculture class, not just a few elite students.	3.25	0.82	3.07	0.73	5.51*
I have been provided with a lot of information about the FFA.	3.24	0.66	2.80	0.82	31.38*
The benefits I would receive from being in the FFA are worth at least the cost of the FFA membership dues.	3.21	0.77	2.66	0.84	35.13*
My agriculture teacher encouraged me to join the FFA.	3.14	0.77	2.73	0.83	24.64*
I think that the FFA is a cool organization.	3.13	0.66	2.54	0.93	43.32*
The FFA information I have seen looks modern and up-to-date with other student organizations.	3.11	0.69	2.93	2.28	0.85

*p<.05. 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree

Table 1 Continued

Perceptions of Members and Non-Members of the Overall Image of the FFA.

FFA Image Items	Members (n=167)		Non-Members (n=237)		F
	Mean	Std. Dev.	Mean	Std. Dev.	
FFA members at my school are nice people who treat non-members with respect.	3.11	0.65	2.88	0.77	8.76*
I knew what the FFA was before signing up for the class.	3.10	0.65	2.67	0.88	23.58*
The FFA has a great image at our school.	3.07	0.77	2.71	0.88	14.94*
Participation in the FFA does not cost much.	3.07	0.81	2.97	2.66	0.23
A lot of my friends are FFA members.	3.01	0.81	2.22	0.91	72.38*
Our school has a lot of FFA activities.	2.94	0.66	2.70	0.85	6.33*
My parents encouraged me to join the FFA.	2.58	0.79	1.86	0.72	70.15*
I like the FFA jacket, regardless of whether or not I am a member.	2.40	0.94	1.97	0.93	17.97*

*$p<.05$. 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree

Students' Perceptions of the FFA Image as Influenced by Selected School and Demographic Factors

There were no significant differences identified in the interaction effects between FFA membership status, gender and ethnicity. FFA membership status and prior enrollment and enrollment choice in an agriculture class had no significant effect the opinions of students. A school's block scheduling status did not significantly influence the respondents' opinion of the FFA image. Furthermore, the interaction effect of FFA membership status and block scheduling did not yield significant differences.

A Pearson Product Moment Correlation Coefficient of 0.08 ($p=.13$) for the correlation between FFA organizational image and the respondent's grade level was generated. Based upon these results, there was not a significant relationship between the respondents' grade level and their opinions of the FFA organization's image.

Another Pearson Product Moment Correlation was computed to test the significance of the relationship between the respondents' level of participation in school organizations on their opinions of the FFA image. A correlation coefficient of 0.096 (p=.11) for the FFA organizational image was generated. There was no significant relationship found between the respondents' level of participation in school organizations and their opinions of the FFA organization's image.

Conclusions, Implications and Recommendations

Conclusion 1: A student's decision to join or not join the FFA is influenced by their perceptions of the image of the FFA organization in their school.

In general, FFA members' responses to items related to the image of the FFA organization were significantly more positive than the responses of non-members.

Conclusion 2: A student's gender and ethnicity do not influence their perceptions of the image projected by the FFA organization in their school.

Students' responses to items on the questionnaire were not significantly influenced by gender and ethnicity. The FFA has developed numerous recruiting materials in recent years that not only represent the current ethnic and gender characteristics of the membership, but also portray what FFA membership could be if it were more diverse in ethnicity and gender.

Conclusion 3: Voluntary enrollment in an agriculture class and prior enrollment in an agriculture class does not influence a student's perceptions of the image projected by the FFA organization in their school.

This study did not find that student's enrollment choice or prior enrollment in an agriculture class made a significant difference in their decision to join or not join the FFA. Students who are involuntarily enrolled in an agricultural class may not necessarily be adverse to joining the FFA, just as students who voluntarily enroll in an agriculture class are not necessary motivated to join the FFA.

Conclusion 4: Block scheduling does not influence a student's perceptions of the image projected by the FFA organization in their school.

Once considered to be an obstacle in the planning and implementation of FFA activities (Becton, 1996), block scheduling did not influence students' decision to the extent that it either encourages or discourages membership. North Carolina schools have been utilizing block scheduling for a number of years, and perhaps FFA advisors have begun to effectively recruit and retain FFA members under the system. Because a low number of students were on a traditional schedule, it would be imprudent to generalize the results of the analysis of this research question to the entire population of students that were enrolled in Agriscience Applications in the spring of 1999.

Conclusion 5: Grade level does not influence a student's perceptions of the image projected by the FFA organization in their school.

This study did not find a relationship between a student's grade level and their FFA membership status.

Conclusion 6: The scope of participation in school clubs and formal athletic activities does not influence a student's perceptions of the image projected by the FFA organization in their school.

The scope of participation in school clubs and organizations might be effective in characterizing the students who might join and participate in FFA activities, but it does not singularly affect a student's opinions of the FFA organization's image.

The results of this study are supported in the literature by Maslow (1970). At an age when most students are becoming eligible for FFA membership, they are also entering a period of human growth and development characterized by a need for contact, intimacy and a sense of belonging. The implications are significant for the FFA and agricultural education in that students tend to join and participate in the FFA based upon the organization's ability to meet a student's need for a sense of belonging. The FFA should continue to seek ways to involve all members in positive personal growth activities that allow students to experience that sense of belonging. Based upon the responses of members, the social aspects of the organization were motivating factors in their desire to be members. However, the students today are not necessarily interested in some of the traditions of the FFA.

One traditional method that the FFA uses to encourage students to feel as if they belonged as members of the organization was through the use of the FFA jacket. Students today hold a less than favorable opinion of the FFA jacket. The FFA may need to work toward providing more sophisticated methods of instilling that sense of belonging and comradeship that the FFA has enjoyed in its long history. Agriculture teachers should not necessarily rely on traditional methods for recruiting and retaining members in the FFA. The FFA services provided to students in years past will not necessarily bring students into FFA membership today. Agriculture teachers should appreciate the traditions of their profession, and use these traditions as motivators to teach effectively. Modern recruiting methods should be developed that capitalize on the favorable impression created by the FFA organization's image.

The findings that emerged from this study led to certain recommendations pertaining to future research. The proposed research might be valuable for those factors reported as being significant for both non-member and FFA members.

A proposal would be to conduct a study to determine the continued need for the official FFA jacket. Both the majority of members and non-members expressed negative opinions as to the style of the FFA jacket. The official FFA jacket has been in use for much of the FFA's history and is a highly recognizable symbol of the organization. Perhaps a study would identify the continued value of the FFA jacket to the organization and suggest alternatives to its use.

Another proposal would be to conduct research into the area of gender and ethnic diversity among agricultural education students. While this study found that no significant differences exist between students of differing ethnic backgrounds, the low number of ethnic minorities in this study necessitates the need for additional study.

For more than 70 years, the FFA has endeavored to make a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education. The FFA advisor must be considered to be a major factor in this endeavor. At one school, the students were in the process of completing the survey instrument when a student raised his hand and, referring to an item on the questionnaire on the instrument, asked the instructor, "Have you encouraged us to join the FFA?" After a pause, the instructor was forced to answer in the negative. In this researcher's opinion, the most disappointing answer given by a student during the administration of the survey instrument was that he or she, "didn't join the FFA because it isn't at my school anymore".

The agriculture teacher has the primary responsibility of seeing that the FFA is an important and functional part of the agricultural education curriculum. He or she must secure positive school and community support for FFA programs and encourage students to participate in these programs. The success or failure of the FFA organization may depend upon a multitude of factors, but the FFA advisor is perhaps the most important factor in the equation.

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The Image Factor: Perceptions Of The FFA Organization By Members And Non-Members

A Critique

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Contribution and Significance of Research

We continue to witness declining percentages of participation in the FFA among students enrolled in secondary level programs of agricultural education. Decreasing enrollment in agricultural education programs has long been a concern for agriculture educators in nearly every state of the US. I've heard some teachers say that the FFA is no longer relevant or appropriate for some of the students in their programs. In some states, this percentage of participation in the FFA is hovering around 50%. In another paper presented during this conference Wakefield and Talbert report that total FFA membership has remained essentially static for the past 35 years. In the same time period, both the population of secondary students, and the enrollment in agricultural education, has greatly expanded. Clearly the FFA will need to determine whether or not it is serving the audience it intends to reach.

The authors are to be commended for exploring a topic that may well be a contributor to the low participation levels in FFA programs, namely that of the perceived image of the FFA. These sometimes-subtle perceptions can be extremely difficult to describe and may well contribute to the problem of low participation rates.

The literature cited by the author's lays a sound theoretical base for this study in the area of the student's need to belong. Maslow's hierarchy of needs was used to ground the study. Additional literature identified environmental, ethnic, and demographic variables that may influence the students' perceptions.

Procedural Considerations

The methods and procedures section did a good job of describing the research design, population and sampling procedures. The researchers established a sample purposive sampling frame of 404 students. Is this sample representative of the population?. The sample is described as being selected on geographic location, but whether or not this is due to some underlying construct, or simple convenience, remains unanswered. In the Findings section, 401 students are described as responding. I would certainly report a 99.25% response rate.

Instruments developed for this study were constructed following procedures that insured content validity and reliability. The researchers are to be commended for doing an excellent job.

Data collection procedures were not described. Multivariate analysis is a powerful tool, and seemed to be appropriately described and used in this study.

The results were well written, but would gain clarity if organized by objective.

Questions for Consideration

Conclusions and implications were based on the findings and summarized concisely. These were organized by objective. This study provides excellent base line information for conducting further research regarding the perceptions of students and the roles these perceptions play in the decision to participate in the FFA. What are the implications for practice? How should these findings be put to use?

Building Confidence and Personal Pride: Perceptions of Selected FFA Members Toward Involvement in the National FFA Organization

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Abstract

The purpose of this study was to determine perceptions of selected members of the National FFA Organization towards the members' *level* of FFA involvement and *benefits* from FFA involvement. To fulfill the purposes of the study, the following research questions were addressed:

1. What activities did selected FFA members participate in that they perceived were most helpful in their development as a person?
2. What *level* of participation did selected FFA members perceive was most helpful in their development as a person?
3. Were there skills that were learned through FFA participation that selected FFA members were able to transfer to other settings in their life? If so, what were the skills, and what areas did they transfer to?
4. Does active participation in the National FFA Organization accomplish something in selected FFA members' lives that no other activity, group, or organization accomplishes?
5. What are the future plans of selected members of the National FFA Organization after they graduate from high school and/or conclude active participation in the FFA?

Qualitative research methods were used to conduct this study. Members of the National FFA Organization were randomly selected for interviewing at each of three events. The events included a week-long session at the 1999 Washington Leadership Conference for FFA members in Washington, D. C., the 1999 State President's Conference for State FFA Presidents, and the 1999 National FFA Convention in Louisville, Kentucky.

An interview guide was developed by the researchers and input was received from members of the National FFA staff. The interview guide contained questions used to explore the members' *level* of FFA involvement and *benefits* from FFA involvement.

When asked for the activities that were most helpful to their development, 62% of selected FFA members answered with leadership training and/or leadership opportunities. When asked what level of participation was most helpful in their development, the most common response, 34 percent, was that participation at the local level was the most helpful. Forty-two percent of the respondents in the study indicated they used leadership skills gained in the FFA in other school related activities. When selected students were asked if participation in the National FFA Organization did something for them that no other activity, group, or organization does, 32% of respondents indicated that the FFA helped them build confidence and personal pride. Finally, selected FFA members of this study were asked for their future plans. Eighty-nine percent indicated they planned to participate in some form of post-secondary education, and 65% of the members plan to become involved in an agricultural related career.

Introduction/Theoretical Framework

The National FFA Organization is a national youth organization for students studying agricultural education in public secondary schools. It is an essential component of secondary agricultural education. Members of the National FFA Organization utilize hands-on learning to gain experiences in leadership training, career exploration, and citizenship development. The main tenets of the association are found in the organization's mission: FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education (Official FFA Manual, 1999). In 1999 alone almost one-half million secondary agricultural education students enjoyed official membership in the National FFA Organization.

Although admirable, this number represents roughly half of all students enrolled in agricultural education programs nationwide. Secondary agricultural education teachers have long perceived the benefits of membership in the National FFA Organization for their students. However, concern exists for the lack of perceived benefits of membership in the National FFA Organization for many of the students enrolled in agricultural education. Renewed discussions concerning the need for FFA and agricultural education have taken center stage in recent issues of the *Agricultural Education Magazine* where questions have been posed to clarify the need for public school agricultural education and the FFA in the 21st century.

Many actively engaged in agricultural education can think of no other opportunities where students can receive the level of exposure to premier leadership, personal growth, and career success (National FFA Organization, 1999) that the FFA has to offer. However, total membership inconsistent with total students enrolled in agricultural education has confounded those closely associated with the National FFA Organization since the benefits of membership appear self-evident. Of an estimated 800,000 agriculture students today, only about 450,000 receive educational benefits as members of the FFA (Stagg & Staller, 1999).

Many members, advisors, parents, and supporters can extol the virtues of membership in the National FFA Organization. However, little information is available that looks at the beliefs and perceptions of the most active FFA members in the organization. Evidence exists that identifies factors influencing students to enroll in agricultural education courses. Marshall, Herring, and Briers (1992) found that students enrolled in agricultural education because of the class characteristics. Hoover and Scanlon (1991) determined that the image of agricultural education, the FFA, and the agriculture profession in general were the greatest barriers for students not enrolling in agricultural education.

Research can lead us to conclusions explaining why some agricultural education students join the National FFA Organization and others do not. Conners, Moore, and Elliot (1990) found that the most important factor influencing non-FFA members to join the organization was their interest in agriculture, while the barriers for agricultural education students not joining FFA included their level of interest in agriculture and the future value of the FFA to their career. And, Gliem and Gliem (1999) reported that class rank, year first enrolled in FFA, interest in agriculture, former family membership in FFA, teacher enthusiasm for FFA, and including FFA activities as part of the classroom instruction were significant predictors for whether a students would be an FFA member or non-member.

"Young people enjoy doing something worthwhile, excelling in their work and play, being appreciated, being in responsible positions, learning how to help themselves, having opportunities to participate in activities, and obtaining recognition through outstanding service and achievement" (Phipps & Osborne,1988, p. 371). Agricultural educators are encouraged to link FFA leadership activities, award programs and competitive events to high quality agricultural education curriculum (Guide to Local Program Success, 1998). Lockaby (1998) concluded that within the agricultural education model, the FFA is the most appropriate tool for teaching values and attitudes to agricultural education students. And, Keith (1998) revealed that the type of competition that youth organizations offer is beneficial to the student as well as their families. Finally, Turner and Herren (1997) compared FFA members with non-FFA members in agricultural education. They found that FFA members had a higher need for achievement, affiliation, and power when compared to agricultural education students who did not join the National FFA Organization.

Qualitative research methodology can be a useful tool as we witness change after change imposed upon the old paradigm of "vocational agriculture" and adapt to new expectations and market forces propelling agricultural education into the 21st century. Furthermore, qualitative research methodology can uncover intricate pieces of evidence that are difficult to obtain using quantitative methods. Denzin and Lincoln (1994) define qualitative research as "multi-method in its focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring them" (p. 2). It was with this approach in mind that the researchers set out to determine the beliefs and perceptions of certain FFA members towards participation in the National FFA Organization. In addition, Moore (1994) stated, "There are times when selecting purposive samples would do more to advance the profession than selecting random samples. At times we need to identify the best programs, best teachers, and best FFA Chapters and study them in detail" (p. 11). The researchers suggest that the effectiveness of certain elements of the FFA mission can best be unearthed by selecting a few of FFA's best and most active members at the national level and engaging them in conversations regarding their experiences in the National FFA Organization.

Purpose/Objectives

The purpose of this study was to determine the perceptions of selected members of the National FFA Organization towards the members' *level* of FFA involvement and *benefits* from FFA involvement. To fulfill the purposes of the study, the following research questions were addressed:

1. What were selected demographic variables of FFA members attending FFA activities at the national level?
2. What activities did selected FFA members participate in that they perceived were most helpful in their development as a person?
3. What *level* of participation did selected FFA members perceive was most helpful in their development as a person?
4. Were there skills that were learned through FFA participation that selected FFA members were able to transfer to other settings in their life? If so, what were the skills, and what areas did they transfer to?

5. Does active participation in the National FFA Organization accomplish something in selected FFA members' lives that no other activity, group, or organization accomplishes?
6. What are the future plans of selected members of the National FFA Organization after they graduate from high school and/or conclude active participation in the FFA?

Methodology

To obtain the data a series of interviews were conducted at the National FFA Convention in Louisville, Kentucky; a week-long session in July, 1999 at the Washington Leadership Conference, a leadership and citizenship development conference held in Washington D. C. during the summer months; and a week-long session in July, 1999 at the State President's Conference, a premier leadership and citizenship development conference held exclusively for State FFA Presidents and State FFA Officers in Washington D. C. The purpose of the interviews was to obtain rich, thick descriptions of the impact of involvement in Agricultural Education and FFA on the youth sampled. In addition, the researchers sought to interview FFA members on-site to gain insights from members during the actual events they were actively participating in. Members of the National FFA Organization were randomly selected for interviewing at each of the three events to limit researcher bias, and no attempt should be made to generalize the results to any particular population.

An interview guide was developed and used by the researchers for all interviews. The interview guide was developed by the researchers and input was received from agricultural education professionals from Purdue University and members of the National FFA staff headquartered in Indianapolis, Indiana. The interview guide contained questions used to explore the members' *level* of FFA involvement and *benefits* from FFA involvement.

The researchers determined that a minimum of 10 and a maximum of 30 interviews should be conducted at each event. This range allowed for data saturation and repetition to occur. In total, interviews were conducted with 63 members of the National FFA Organization. Interviews were conducted to collect information regarding student attitudes and perceptions about their family, skills, and issues in their future such as school and work. Furthermore, the interviews sought to gather FFA members' perceptions concerning their involvement in the National FFA Organization and the influence FFA has had upon various aspects of their life.

Twenty-nine interviews were conducted during the Washington Leadership Conference session that was held July 6-11, 1999, and ten interviews were conducted during the State President's Conference held July 26-August 1, 1999. An additional 24 interviews were conducted at the National FFA Convention on October 28, 1999. Data were analyzed using an open coding system. Strauss and Corbin (1990) state "open coding…is the analytical process by which concepts are identified and developed in terms of their properties and dimensions" (p. 74). Conceptual labels were placed on the answers FFA members provided. The answers were then analyzed to determine similarities and differences. Conceptual labels were then grouped into categories comprised of similar properties.

Quantitative Findings

Research question 1 sought to determine demographic characteristics of selected FFA members participating in the National FFA Convention, Washington Leadership Conference, and State FFA President's Conference. Table one details selected demographic variables. The average age of participants randomly selected at the three national conferences was 17.1 years of age. Forty-four percent of the participants were female, and three out of four had a family member previously involved in agricultural education, FFA, or 4-H. Two in five were 4-H members and, as a group, had a grade point average of 3.48 (out of 4.00 index). Two-thirds were active in a church youth group, 55% participated in sports during the school year, and 87% were involved in a club activity during the school year other than FFA.

Table 1
Selected Demographics of FFA Members Participating in National FFA Convention, Washington Leadership Conference, and State President's Conference (N=63)

Category	Response	Frequency	Percentage
Age	15	3	4.8
	16	15	23.8
	17	28	44.4
	18	11	17.5
	>18	6	9.5
Gender	Male	35	55.6
	Female	28	44.4
Grade	10	4	6.3
	11	19	30.2
	12	28	44.4
	College Freshman	7	11.1
	College Sophomore	4	6.3
	College Junior	1	1.6
Ethnicity	White	61	96.8
	Black	1	1.6
	Hispanic	0	0
	Asian American	0	0
	Multiracial	1	1.6
	Native American	0	0

Table 1 (Continued)

Category	Response	Frequency	Percentage
Parents/Siblings in Ag Education, FFA, 4-H	Yes	48	76.2
	No	15	23.8
Live on[a]	Farm	37	58.7
	Rural	21	33.3
	Urban	3	4.8
	City	2	3.2
Current 4-H Member	Yes, current member	27	42.9
	No, former member	22	34.9
	No	14	22.2
Grade Point Average[b]	2.50-2.99	6	9.5
	3.00-3.49	19	30.2
	3.50-4.00	35	55.5
	missing	3	4.8
Participated in any activity	Yes	61	96.8
	No	2	3.2
	Sports	35	55.5
	Clubs other than FFA	54	85.7
	Church Youth Group	41	65.0

[a] Urban defined as area with subdivisions, many stoplights, and lots of stores. City defined as area with little open space except for parks, one or more shopping malls, is one of most populated areas of the state. [b] Self-reported and converted by the researchers to a scale of 4=A, 3=B, 2=C, 1=D, 0=F.

Qualitative Findings

Research question 2 sought to determine the activities that selected FFA members perceived were most helpful in their development as a person. Sixty-three subjects responded to this question providing a total of 122 answers. Twenty-one subjects out of 63 answered with leadership oriented training as the first response that came to mind when asked this question. This represents 33 percent of the sample. Furthermore, 36 total individuals (57%) responded to the question by referencing leadership training in some part of their answer. Responses included:

Leadership training; Leadership camp; Leadership conferences

Thirty-two percent (20 of 63) of the respondents indicated through their initial answer that "parliamentary procedure, public speaking opportunities, and serving as an officer" was the FFA activity that was most helpful for them in their development as a person. Also, 39 of the 63 subjects, 62% of the sample, included leadership opportunities in their answer. Responses included:

> *Leadership opportunities in parliamentary procedure and/or public speaking; Leadership opportunities such as being an officer*

Nine of 63 individuals answered that "participation in State and/or National FFA Convention" was the most helpful FFA activity in their development as a person, accounting for 14 percent of the respondents. In all, 13 individuals, 21% of the subjects, listed this response when answering this question. Answers included:

> *Participation in State FFA Convention; and/or Participation in National FFA Convention*

Eleven respondents answered that the most helpful FFA activity to their development as a person included some form of Supervised Agricultural Experiences, and/or activities that may be related to their SAE. This represented 17 percent who answered with SAE as their first response to the question. Overall, 35 percent of the subjects, 22 of 63 subjects, included Supervised Agricultural Experiences and related activities in their answer. Responses included:

> *Supervised Agricultural Experiences; Career Development Events; Proficiency Awards; Showing at Fair*

Finally, four subjects, 6 percent of the sample, perceived some involvement in chapter events, participation in the Program of Activities, involvement in community service, and the curriculum in their agricultural education classes as the most helpful FFA activity in their development as a person. Overall, 17 percent of the subjects, 11 of 63, included these activities somewhere in their answer. Answers included:

> *Agricultural Education curriculum; Chapter Events; Program of Activities; Community Service*

Research question 3 sought to determine what *level* of participation did selected FFA members perceive was most helpful in their development as a person. Thirty-four percent of the subjects, 21 of 61, identified participation at the local level as the most helpful. When asked how it was helpful the following responses were given:

> *The opportunity to make friends; the opportunity to do things with people in the chapter; being able to receive support*

In response to the same question seven of 61 subjects, 11 percent, identified participation at the district level as the most helpful. When asked how it was helpful the following responses were given:

The district level has helped me overcome my shyness; the district level experience was a growing process

Thirty-one percent of the subjects, representing 19 of 61 respondents, identified participation at the state level as the most helpful. When asked how it was helpful the following responses were given:

Competition in FFA activities at the state level is harder and/or more challenging

Finally, 23 percent of the subjects identified activities at the national level as the most helpful in their development as a person. Fourteen of the 61 subjects who provided that answer stated it was most helpful for the following reason:

Can appreciate the larger scope of the organization; I received skills to be successful in the future; a greater opportunity to meet more people

Research question 4 asked members of the National FFA Organization to identify if there were skills that were learned through FFA participation that they were able to transfer to other settings in their life. If so, what were the skills, and what areas did they transfer to? Subjects involved in the National FFA Convention, Washington Leadership Conference, and the State President's Conference were asked to give an example of a situation other than FFA or agricultural education classes when they used a leadership skill that they gained in the FFA. Twenty-six of the 62 subjects who answered the question responded that school activities including sports, class, school officer activities, and other high school courses were activities where they were able to use leadership skills they had gained through the FFA. This response accounted for 42 percent of the sample. Answers to the question included:

School activity – Class office, other high school class; school sports

Twenty-one subjects responded to the question by answering they used a leadership skill gained in the FFA to make a presentation that was of an agricultural nature. Audiences included alumni groups, commodity groups, and presentations to agricultural education supporters. This represented 21 percent of the sample. Answers included:

Agriculture related speech; presentation to commodity groups; presentation to alumni organization; presentation to the local Farm Bureau

Eleven percent of the respondents indicated the leadership skills they gained in the FFA were most useful for them in no specific activity, but rather most useful in their everyday interaction with others and their ability to communicate with co-workers and fellow students.

This represented seven of the 62 individuals responding to the question. Responses given included:

Everyday communication; working with other people

Five of 62 respondents, 8 percent, indicated they were able to transfer the leadership skill they gained in FFA into activities involving participation in a 4-H club, and nine percent of the subjects, six students, identified church and other activities as the location they were able to use the leadership skills they gained in FFA. Answers included:

4-H Club; Church and other opportunities

Research question number 5 asked FFA members to respond to the question "does the FFA do something for you that no other activity, group, or organization does? If yes, please explain." Sixty-three individuals responded to this question providing researchers with 89 different answers. Twelve of 63 individuals indicated "leadership training and leadership opportunities" as the first response that came to their mind when asked this question. This represents 19 percent of all responses to this question. An additional eight subjects responded with this answer as their second or third response to the question for a total of 20 of 63 individuals who responded with some form of leadership training and/or leadership opportunities when asked this question. This represents 32 percent of all responses given to the question. Responses included:

The FFA provides leadership training and leadership opportunities; the FFA builds confidence and personal pride

Eleven of 63 individuals indicated "teaches life skills" as the first response that came to their mind when asked this question. This represents 17 percent of all responses to this question. In total, 12 of 63 subjects responded with this answer as their first, second, or third response to the question representing 19 percent of the responses. Responses included:

Teaches me life skills; helps me understand agriculture; allows me to help others; gets me involved

Ten of 63 individuals indicated "preparation for the future" as the first response that came to their mind when asked this question representing 16 percent of the overall subjects, while 24 percent of all students answered the question with some form of career preparation and/or thoughts about the future. Answers included:

Causes me to think about my future; Allows for career preparation; Causes me to work harder in school and for scholarships

Seven of 63 individuals indicated "meeting people" as the first response that came to their mind when asked this question representing eleven percent of all subjects, while 21 percent of all students answered the question with some form of meeting new people/getting to know individuals from a variety of geographic locations as their response to this question. Answers included:

> *Chance to be with people from all over the United States and/or the chance to meet new people*

Seven of 63 individuals indicated the opportunity to travel as the first response that came to their mind when asked this question representing eleven percent of all subjects. Ten of the 63 respondents, representing 16 percent of the subjects, answered the question with travel opportunities as either their first, second, or third answer listed.

Research question number 6 asked for FFA members to identify their future plans after they graduate from high school and/or conclude active participation in the FFA. As an open-ended question multiple responses were accepted. The following answers were collected:

> *Attend college (either 4-year, 2-year, technical school)*
> *Involvement in an agriculture related career*
> *Teaching (in general)*
> *Agricultural Education Teacher*

Fifty-six of the subjects indicated they planned to attend some form of education beyond high school graduation. This represented 89 percent of the sample. Sixty-five of the respondents, 41 of 63 subjects, indicated they planned to be involved in an agriculture related career. Teaching, in general, accounted for 22 percent of the responses. Fourteen of the 63 subjects gave this answer to the question concerning their future plans. Finally, 8 of 63 subjects (representing 13 percent) indicated their future plans included becoming an Agricultural Education teacher.

Conclusions, Implications, and Recommendations

According to demographic data for selected members of the National FFA Organization who participated in the 1999 National FFA Convention, 1999 Washington Leadership Conference, and the 1999 State President's Conference the majority are juniors and seniors in high school, almost entirely Caucasian, live on farms or in rural areas, and have either parents or siblings who participated in agricultural education, FFA, or 4-H. In addition, they achieve good grades and almost all are active in something *other* than FFA. This includes sports, other clubs, and/or church related youth group.

This implies that FFA members attending national activities are good students and are active in school and community events. This also implies that few minorities and those living in city and urban settings are likely to participate in activities at the national level. It is recommended that members of the planning staff of national FFA activities create materials portraying opportunities for minorities, urban members, and first generation FFA members in an effort to attract *all* FFA members to participate in activities at the national level.

When asked for the activities that were most helpful to their development, 62% of selected FFA members answered with leadership training and/or leadership opportunities. One could expect this answer since two of the three activities where interviews were conducted were conferences seen by many to focus on premier leadership development. However, 35% also indicated that participation in Supervised Agricultural Experiences, Career Development Events, Proficiency Awards, and showing at their local fair were helpful. This implies that selected students who are actively pursuing leadership training are also interested in gaining experience in career exploration. As a result, staff of the National FFA Organization should take steps to insure that the general public, contributors, local stakeholders, and school officials are aware that the FFA's mission that "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" *is* working and available for students willing to take advantage of the opportunity.

When asked what level of participation was most helpful in their development, the most common response, 34 percent, was that participation at the local level was the most helpful. Selected FFA members indicated that making friends and receiving support was how the local level had helped them. Although every participant was interviewed at an FFA activity occurring at the national level this implies that regardless of the excitement and enthusiasm that traveling and seeing new places fosters, selected FFA members believe that nothing is as important as participation at the local level. Local agricultural education teachers should focus on ensuring healthy, local participation from all students in their program *before* attempting to solicit students to become active at the district, state, and national levels.

Selected students were asked to identify another setting where they used a leadership skill that was learned through participation in the FFA. Forty-two percent of the respondents in the study indicated they used leadership skills gained in the FFA in other school related activities. Examples included student council, class office, school sports, and involvement in other high school classes. The second most common answer included presentations to commodity groups, alumni organizations, and/or local farm bureaus. This implies that these students are indeed utilizing and transferring the leadership skills gained in the FFA to other activities within their school and community. It is recommended that, although these were selected students at national activities, local agricultural education teachers encourage students to capitalize on every opportunity to practice their leadership skills regardless of the setting in order to gain needed experience in leadership development.

When selected students were asked if participation in the National FFA Organization did something for them that no other activity, group, or organization does, 32% of respondents indicated that the FFA helped them build confidence and personal pride. In addition, they indicated that FFA provided them with leadership training and leadership opportunities. This indicates that for the selected FFA members involved in this study many of them were more confident in themselves after participating in the FFA than they were before they became involved. Although it is difficult to determine if the growth in personal pride and confidence was a result of participation in the National FFA Organization, it is recommended that a further study look into this aspect of personal development as a function of membership and participation in FFA. If this is indeed true, this information can be useful for informing parents of the approximately 350,000 secondary agricultural education students who are not FFA members in hopes of encouraging more students to participate.

Finally, selected FFA members of this study were asked for their future plans. Eighty-nine percent indicated they planned to participate in some form of post-secondary education, and 65% of the members plan to become involved in an agricultural related career. This implies that for the FFA members selected for this study the majority have found careers in agriculture to be a good fit. Further studies should examine if this number is consistent with the general membership of the FFA and the general population of the approximately 800,000 agricultural education students across the nation.

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Building Confidence and Personal Pride: Perceptions of Selected FFA Members Toward Involvement in the National FFA Organization

A Critique

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Contribution and Significance of Research

The FFA has long been recognized as the heartbeat of secondary level agricultural education programs. This study more than takes the pulse; it is a stress test on that heartbeat. Organizations are born, thrive, wither and die based on the perceived benefits of membership.

This examination of the perceived benefits of the FFA to those most likely to serve as its future leaders is both timely and important. These young people had all chosen to attend national leadership events. While not necessarily a clear reflection of the average FFA member, they should closely resemble those who will rise to the top of the National FFA organization. This study may be viewed as providing evidence of client-satisfaction from the future leadership of the FFA.

Like the Croom/Flowers and the Wakefield/Talbert papers presented at this conference, this study also raises issues about the diversity of the FFA. We clearly need to work toward a national consensus to provide direction to the profession to work toward achieving diversity in the years ahead.

This is a benchmark study addressing perceptions of benefits and levels of participation in the National FFA organization the early 2000s. The authors are to be commended for examining an issue with such high potential implications for the profession.

Procedural Considerations

The purpose and objectives were clear, and well supported by the theoretical framework.

The authors are to be commended for using appropriate methods to address the research questions formulated. Many in the profession continue to avoid qualitative research methods, even when they would be most appropriate for given research question. Qualitative methods allow us to examine samples selected with a narrow purpose. The population identified in this study made logical sense; interviews were conducted at three of the flagship leadership events of the National FFA.

An interview guide was developed and used to guide questioning. Open coding was appropriately used. Because qualitative methods are still so new to this profession, this reviewer would like to see a bit more methodological detail. How did the researchers ensure credibility? Were member checks conducted? How did the authors address dependability? Were overlapping methods used? Was a dependability audit performed? Qualitative researchers need to continue to educate those of us unfamiliar with the methodology.

Questions for Consideration

Looking ahead, what pragmatic, systematic, continuing steps can be incorporated into strategies that teachers, area and state-level supervisors, and teacher educators can use to accurately communicate the benefits of FFA membership to all students? What implications for action can be drawn from the conclusion that local-level leadership activities are in fact the most beneficial for the members' "development as a person?" Are resources currently being applied to the most appropriate levels to maximize the benefit for FFA member's development?

Exploring the Past of the New Farmers of America (NFA): The Merger with the FFA

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Abstract

This paper, "Exploring the Past of the New Farmers of America (NFA): The merger with the FFA", identifies the rationale that existed in the 1960s which may have led to the merger of the New Farmers of America (NFA) and the Future Farmers of America (FFA). It also includes memos presented from archives referencing the controversies surrounding the merger immediately before and after 1965. This paper is divided into sections with examples of pertinent information found in archives surrounding the merger.

History is used as a guide in determining what has led to the decrease of African American students in the FFA. The NFA was a thriving organization for African American males prior to the merger in 1965 with over 58,000 members, but since that time total membership for African Americans in the FFA has declined by over 38,000. Focusing on diversity is a major issue in today's society. Looking back at the past is one way of determining what may have led to the decline of African American students in agricultural education.

Background information is presented referencing the general history of the NFA and the everyday activities of the organization, which includes the Aims and Purposes of the organization, the National Conventions, the sections of the NFA, the Contests and Awards of the NFA, the emblem, the National Officers, and local officers and their stations.

In the early 1960s, representatives of the NFA and the FFA met to discuss the possibility of merging the two organizations. Several letters were written referencing correspondences going on during this period by both organizations. The organizations merged and appeared to be a success, but members of both groups presented several questions that were very important to the intended infrastructure of the FFA. Much progress was being made after the merger, but the question of fair treatment of NFA supervisors was continuously presented due to the nonexistence of African American in supervisory roles.

The NFA was an organization that had a full history of accomplishments and was a thriving organization in 1965 at the time of its merger with the FFA. However, the number of African American males in 1965 exceeds the number of African American males and females in the FFA today. Recommendations include additional research on increasing African American participation in the FFA, research that goes beyond the African American issues to include other underrepresented populations, and inclusion of pertinent NFA materials in the Official FFA Manual.

Introduction/Theoretical Framework

The New Farmers of America (NFA) was a national organization of Negro farm boys studying vocational agriculture in the public schools throughout the United States. Its purpose was the development of its members in vocational, social, and recreational life through established chapters. The NFA was started in Virginia in 1935 expanding from a few chapters and members to 58,132 active members at its height in 1963 (Norris, 1993; Strickland, 1995). At the merger with the Future Farmers of America (FFA) in 1965, NFA members were approximately 52,000 of the 454,000 total FFA membership (Bender, Taylor, Hansen, & Newcomb, 1979). Today, there are approximately 20,000 active African America members in the FFA (Moore, 1994) although it has an overall membership of more than 450,000 (Official FFA Manual, 1999).

Prior to 1965, the idea of merging the NFA and the FFA was presented to both organizations. After numerous meetings and skepticism between the organizations, the merger was approved. Before the NFA-FFA merger, there were many African American teachers, supervisors, and professors. A decade after the Smith-Hughes Act in 1917, African Americans in these professional fields increased rapidly (Bowen, 1994). After the 1960s federally mandated desegregation and state compliance efforts ended, the infrastructure that maintained substantial numbers of African Americans in agriculture declined drastically (Bell, Powers, & Rogers, 1987).

With the decline in African Americans in key roles, membership in the agricultural sciences has steadily decreased for African Americans in agriculture. In 1965, there were more than 52,000 African American members in NFA when it merged with the FFA. The National FFA Foundation in 1993 reported that FFA membership was 4.5% African American or approximately 20,000 members (Moore, 1994). In viewing these statistics, the question of what is being done to increase minority or underrepresented students in the FFA becomes a major factor. Increasing minority involvement in agricultural education is a stated goal of the agricultural education profession. The National Council for Agricultural Education (The Council) reported that the profession was committed "to reach, attract, and develop the human potential of all people-regardless of race, creed, color, sex…" (National Council for Agricultural Education, 1989, p.4).

History can be one guide in determining what has led to the decrease of African American students in the FFA organization. Today, FFA membership is one-fourth female, two-thirds non-farm, and less than five percent African American (Moore, 1994; National FFA Organization, 2000). In terms of measurable progress, FFA has had the least success with ethnic (African American) diversity. Whereas prior to the 1960s African American agriculture teachers served as strong community leaders, once these teachers vanished their leadership roles were not sustained by the agriculture teachers who replaced them (Bowen, 1994). Whent (1994) stated that the agricultural education profession continues to exhibit a severe shortage of teachers and students from diverse populations and that often members of minority populations are impeded from entering agricultural education because of embedded biases of teachers and White students.

Focusing on diversity is a major issue in today's society. One way of looking toward the future is to look back at the past to see what may have led to the decline of African American students in agricultural education. The emphasis on diversity and pluralism continues to grow in recognition of demographics, economics and social changes taking place in the United States today (Ingram & Nyangara, 1997). "Some could argue that the focus of future diversity efforts should be on enrolling more minority students and increasing membership in the FFA where programs are currently being offered" (Moore, 1994, p. 14). Larke (2000) stated "One of the big questions is how do we sensitize non-minorities to the need, get them to take ownership of the challenge and recruit students of color" (p.9).

It is important that history be remembered, as the NFA was a thriving organization prior to the merger in the 1960s (Norris, 1993; Strickland, 1995). In the year 2000 we are 35 years removed from the merger. The agriculture teachers at that time are either retired or near retirement and the NFA and FFA members involved at that time may have fading memories of the specifics of the events. The oldest FFA member in 2000, born in 1977 or 1978, was not born until a decade after the merger. From 1964-1966, virtually no articles were published in The Agricultural Education Magazine about the 1965 merger (Bowen, 1994). Radhakrishna (1998) reported that of the 701 papers presented at the National Agricultural Education Research Meeting (NAERM) over its 25-year history, 14 had women or minorities as a subject matter topic. Of these 14, only two were presented in the 1980s and zero in the 1970s. Further, from 1986-1996 only seven journal articles with the subject matter topic of women or minorities were published in the Journal of Agricultural Education (Radhakrishna, 1997).

Purpose/Objectives

The guiding purpose of this research was to document detailed background information on the New Farmers of America (NFA). An additional purpose to the study was to remember the past in order to increase diversity in today's agriculture. The specific objectives were to:

1. Identify the rationale that led to the NFA/FFA merger in the 1960s.
2. Identify the controversies surrounding the NFA/FFA merger immediately before and after 1965.

Methodology

Historical research methods were utilized to accomplish the objectives of the study. Both primary and secondary sources were utilized to obtain the information needed. Primary sources included letters, documents, and federal law minutes of meetings and bulletins. Secondary sources included books, journal articles, doctoral dissertations, master theses, and magazine articles. Information was collected from the Purdue University libraries and the National FFA Archives located at Indiana University – Purdue University Indianapolis (IUPUI).

"History, it has been said, does not repeat itself- but historians often repeat each other. The study of the past is the study of events that took place, what people said or wrote then, and the trends that developed. Such matters cannot be changed, but the evidence of them varies widely and their description and interpretation are often revised" (Brooks, 1969, pg. 2). This quote guided the researcher in revisiting artifacts and what has been written about them. Past artifacts can be used to help local communities in productive and practical way (Denzin & Lincoln, 1998).

As researchers it is important for us to remember the past in order to progress toward a positive future. "In remembering the past, individuals tend to romanticize it. Time heals wounds, and many informants no longer remember fully just how bad conditions were" (Wright, 1988, p. 15). Maybe this is natural when considering that many of these older people now live alone, have no loved ones, and then see their earlier lives in an easier light. Throughout this paper the researcher was deeply absorbed in unearthing the buried past of African Americans in agriculture. In recent years discussions about underrepresented populations has been an issue in agriculture. The question of validity is a major concern to this issue. In establishing my commitment to the discovery and dissemination of my authentic African American experience, I came to appreciate the crucial role to be played by conducting an archival study on the impact of the NFA. Therefore I ask the question, "Why should historical research be conducted?"

The researcher chose to study the past:

- To make the past, especially its occurrences and products his own
- To lengthen knowledge about past events
- To make past occurrences and the past more honorable or richer in meaning
- To harmonize past occurrences with current values and orientations
- To hold on or cherish past events, achievements, condition, and so on
- To use the past to meet present and future needs, such as when people draw upon past lessons that history teaches in order to avoid making the same mistakes (Stahl, 1995).

The researcher's primary sources of data were at the National FFA archives located at IUPUI in Indianapolis, Indiana. All boxes that were marked representing the NFA were collected and placed on reserve by the librarian. Pictures were also selected for review but will not be referenced in this paper. Firsthand letters from individuals involved in the NFA and FFA were retrieved and copied for validity purposes. Official documents referencing the origins of the NFA; logistics of the NFA such as ceremonies, conventions, relationships between members of the NFA, FFA and the federal government, and NFA minutes; and the proposal of the union of the NFA and the FFA were copied.

The secondary sources of collecting data were books written by past members of the NFA, journal articles, doctoral dissertations, and magazines articles collected from the Purdue University libraries. Field notes were taken for further reference purposes documenting all resources that were available at the IUPUI libraries that referenced NFA history and the NFA/FFA merger.

Findings

Background Information on the NFA

The general history of the NFA has been well documented. Strickland's (1995) book provides an account of the NFA from 1935-1965. Tenney (1977) includes text and pictures from activities of the NFA. To understand the years surrounding the NFA and FFA merger of 1965, some background information is useful.

Prior to the merger, the NFA instilled in its members the importance of developing their vocational, social and recreational life. The Aims and Purposes of the NFA (New Farmers of America, 1963) were:

1. To develop competent, aggressive, agricultural, and rural leadership.

2. To encourage intelligent choice of farming occupations.
3. To encourage members in the development of individual farming program.
4. To encourage members to improve the home, the farm, and surroundings.
5. To participate in worthy undertakings for the improvement of agriculture.
6. To practice and encourage thrift.
7. To develop character, train for useful citizenship, and foster patriotism.
8. To participate in a cooperative effort.
9. To provide and encourage the development of organized rural recreational activities.
10. To strengthen the confidence of farm boys and young men in themselves and their work.
11. To encourage improvement in scholarship.
12. To create and nurture a love of country life.

The NFA was established on the basis that all students of vocational agriculture in high school were eligible for membership. The NFA held an Annual National Convention in Atlanta, Georgia, had State and National Officers from 16 primary Southern states, and had many leadership building programs and activities. Awards of the NFA included: The H.O. Sargent (Young Farmer Award), the Star Superior Farmer, the Star Modern Farmer, Dairy Farming, Farm Mechanics, Farm Electrification, Farm and Home Improvement, and the Soil and Water Management Award. There were additional contests in public speaking, quiz, talent, and chorus. Membership in the organization was of four kinds: (1) Active, (2) Associate, (3) Collegiate, and (4) Honorary. The four degrees of membership were (1) Farm Hand, (2) Improved Farmer, (3) Modern Farmer, and (4) Superior Farmer.

The NFA emblem included the plow; the owl; the rising sun; an open boll of cotton with two leaves attached at its base; and an American eagle with shield, arrows and an olive branch. The emblem also included the letters "NFA" and the words "Vocational Agriculture."

The national officers were a President, three Vice-Presidents (one from each NFA section), a Secretary, a Treasurer, and a Reporter. A local officer team was comprised of the President, stationed by the rising sun; the Vice-President, stationed by the plow; the Secretary, stationed by the cotton boll; the Treasurer, stationed by the picture of Booker T. Washington; the Reporter, stationed by the United States flag and the NFA flag; and the Advisor, stationed by the Owl and picture of H.O. Sargent.

The NFA placed member states into one of three sections. They were:

- The Booker T. Washington Section – Delaware, Maryland, North Carolina, South Carolina, and Virginia
- The H.O. Sargent Section – Alabama, Florida, Georgia, Kentucky, and Tennessee
- The Almmot Section – Arkansas, Louisiana, Mississippi, Missouri, Oklahoma, and Texas.

When compared to the FFA (Official FFA Manual, 1999) the NFA had similar aims and purposes, membership structure, and emblems. The NFA was different in some of the names given to degrees, officer stations, and organizational structure of states.

Pre-merger of the NFA/FFA

The merging period as a trying time for all organizations involved, but justification was given for the purpose of the merger. African American males had been members of the FFA in states where separate schools were not maintained and many who attended these integrated schools became active members of the FFA (Tenney, 1977). The Future Farmers of America Foundation gave funding to both organizations for outstanding achievements. The FFA National President spoke at the National NFA Conventions and vice versa. The National Future Farmer Magazine carried stories on the NFA Convention and other activities of the organization (Strickland, 1995).

Because of these reasons and with the national debate on Civil Rights in the early 1960s, the NFA and the FFA decided to meet to consider merging the two organizations. In 1962 the NFA and FFA national officers held a joint meeting to discuss their two organization (Strickland, 1995). The process of merging the two organizations was long and difficult. Some states were either reluctant to merging or were moving at a slower pace than expected by the government. It was not until Congress passed an Act prohibiting segregation in public schools that all African American students of vocational agriculture could become members of the FFA (Tenney, 1977).

On June 20, 1963, Alice Owsley, Secretary to Arthur L. Harris of the Department of Health, Education and Welfare, sent a letter to the Future Farmers of America and the Future Homemakers of America with an attempt on making it clear that there would be repercussions to those states that did not comply to desegregation. The note stated,

> This is to confirm telephone arrangements for a meeting to discuss the future of segregated components of these organizations, which you were invited to attend, on July 1, 1963, from 2:00 to 3:00 p.m. in Dr. Harris' office, Room 2-A-005, 400 Maryland Avenue, SW.

On July 10, 1963, Dr. Walter M. Arnold, Assistant Commissioner of the Division of Vocational and Technical Education, Commissioner of Education Francis Keppel, and Arthur L. Harris issued this memo to the Future Farmers of America and the Future Homemakers of America.

> At the meeting in my office on July 1, to discuss FFA-NFA and FHA-NHA, it was proposed that the following suggestion be presented to each of the national advisory boards for these organizations on their earliest respective meeting dates:
>
> That the ____________________ Association consider the adoption of a policy of withholding from membership or affiliation State associations which discriminate on the basis of race in their membership policies.
>
> Staff members of the Division of Vocational and Technical Education in attendance at the meeting were not in complete agreement as to the presentation of such a proposal at this time, although there was no disagreement with the basic principle involved.

> We believe that it is desirable and appropriate that the Office of Education proceed without delay to make its position clear with reference to discriminatory practices in these associations.

After the FFA/FHA meeting on July 10, 1963, Dr. Arnold issued this July 26, 1963 memo to Francis Keppel, the Commissioner of Education.

> This is in reply to a memorandum of July 10 from Dr. Arthur L. Harris concerning the Future Farmers of America and the Future Homemakers of America.
>
> Our staff has met and discussed thoroughly the proposal in the memorandum. It was the unanimous opinion of our staff that the next logical step would be to call a meeting, in Washington, D.C., of State Directors of Vocational Education, Supervisors of Home Economics and Agricultural Education, and National and State officials of the FFA, NFA, FHA and NHA from those States concerned. We believe it would be advisable to prepare a series of specific proposals to present to this group concerning the eventual complete integration of these organizations and that consideration be given to future dates for the completion of various phases of this process. Such a procedure might produce a faster action than the other limited step.
>
> It appears to us inadvisable at this time to seek the withholding from membership of certain State associations that are not integrated. The FFA and FHA now accept all persons who are qualified as members. As State associations and local chapters become integrated, they leave segregated organizations and enter fully into the activities of the FFA and FHA.

The need for merging the two organizations had been discussed with the National Board of Directors of the FFA and members of the NFA. After thorough consideration, the need for gradual merging was agreed upon. In a meeting to discuss the future of segregated components of the FFA and FHA, several questions were raised. Wm. Paul Gray, National Executive Secretary of the FFA sent this memo to A.W. Tenney, Director of the Agricultural Education Branch:

1. What are the possibilities of accelerating integration of the FFA and FHA with counterpart organizations?
2. Have all possibilities of integrating the organizations been exhausted?
3. What is the significance of the reference to the FFA and the NFA in the George Barden Act?
4. Are we behind times in integrating the organization? (The White House, Secretary Celebrezze, and Commissioner Keppel have indicated their dissatisfaction with the progress that is being made since the integrating is only as rapid as schools are becoming integrated).
5. Is it true that in some States a Negro student of vocational agriculture cannot belong to the FFA and FHA?
6. What States are moving most rapidly toward integrating these two organizations?

7. What can be done to speed the integration in: a. Border States, b. States in the deep south?
8. What adjustments will be necessary relative to employment of Negro State staff members, as well as teachers of vocational agriculture?
9. What leadership should the National Organization provide to smooth the transition of the present two organizations into one?
10. How strong is the feeling in the NFA (both adults and students) toward integrating the FFA?

The group proposed that the problem of integrating the organizations be discussed with both the Board of Directors of the FFA and the Board of Trustees of the NFA at their forthcoming meeting that summer, and to explore the steps to be taken in integrating these two organization.

There was much progress being made toward the merging of the two organizations. Field notes by an unnamed author presented 15 goals of the FFA-NFA merger.

1. Have NFA President speak at FFA Convention
2. Have FFA President speak at NFA Convention
3. Have officer training done jointly in 1964 and annually thereafter
4. Have exploratory meetings of [FFA Board of Directors] and NFA [Board of Trustees].
5. Recommend interorganization act. On state and local levels
6. Have National Future Farmer use NFA stories.
7. Change name of FFA to Future Farmers and Agriculturalists
8. Change name of NFA to Future Farmers and Agriculturalists
9. Continue Atlanta Convention for five years or less
10. Recommend the merging of FFA and NFA on state and local levels as soon as expedient
11. Permit delegations from all eligible associations and chapters to attend National FFA Conventions
12. Continue NFA Award Program for five years or less
13. At the end of five years distribute foundation funds to states on basis of FFA membership
14. Encourage participation of FFA members in all local, regional and national contest and award programs
15. When NFA is changed to FFA, change NFA degrees and ceremonies to FFA.

> It is recommended to the Board of Directors of the FFA and the Board of Trustees of the NFA that the National Organization continue to sponsor the FFA and its component part (the NFA) until December 31, 1965, so that both groups can make adjustments, and prepare for the elimination of the NFA Convention. It is also recommended that the State Associations integrate the chapters as rapidly as possible so that by June 30, 1968, all Negro students of vocational agriculture will be members of the FFA (NFA Archives).

Strickland (1995) summarized the details of the actual merger. The FFA National Board of Directors and the U.S. Commissioner of Education approved that membership in FFA effective July 1, 1965 was open to all agriculture students regardless of race, color, or national origin. It was further recommended that States not fulfilling this requirement be no longer considered in good standing with the National Organization until such requirements have been met (NFA Archives). The NFA held its final National Convention during the first week of October 1965. The next week at the National FFA Convention a ceremony was held to symbolize the merger of the NFA and the FFA.

Post-merger of the NFA/FFA

J. Levonne Chambers, Attorney at Law and former NFA member, sent this memo to John W. Gardner, Secretary, Department of Health, Education and Welfare on April 6, 1966, less than a year after the merger.

> As a former member of the New Farmers of America, a national organization of Negro students studying vocational agriculture, and one presently interested in desegregation of educational programs in North Carolina, I have been particularly interested in and disturbed by the merger or desegregation of vocational agricultural programs in the public schools in North Carolina. The merger or integration of these programs and of the New Farmers of America and the Future Farmers of America (the white counterpart of the former) have raised serious questions as to the role that Negroes are to play in the new system and of the effect of the merger or integration on vocational agricultural teachers and students.
>
> It is my understanding that three Negroes have been appointed as supervisors in the state vocational program, none of who has been given a specific role or function. It is assumed that the white supervisors in the area formerly supervised by Negroes are now to assume the role of the former Negro supervisors. Further, Negro supervisors are customarily assigned to supervise Negro schools. Integration in the administrative staff beyond the supervisor level has not taken place. Negro students in vocational agriculture have not been integrated into the program. Many Negro teachers and supervisors of long experience have apparently been ignored or given positions without clear functions…Negro officers were merged out of existence… The present program in North Carolina is having a demoralizing effect upon the students and adults and others interested or active in vocational agriculture…

Another unknown author in 1963 wrote,

> "There is a sincere concern by many Negro leaders that the values Negro youth are now receiving will be seriously jeopardized during the transition period, and much needed educational opportunity lost at a crucial time. It is not expected by any, however, that a transition can be made without some losses as work is going on toward gains" (NFA Archives).

Many after the merger echoed his same sentiment. As early as November 1965, one month after the merger, questions were raised regarding the roles of African American, former NFA members, administrators, and teachers. Norris (1993) documented that the U.S. Office of

Education did not approve a request for the appointment of a former NFA member to serve as a regional representative for agriculture.

With the merger, the NFA was required to give up its name, constitution, bylaws, emblems, money and it 52,000 members. The merger required the NFA to transfer all its National assets to the FFA. The transfer was substantial; in the 1964 audit report the NFA had $10,445.56 in checking, $32,355.30 in savings, and $3,800 in stocks and bonds (NFA Archives). The African American teachers and state staff who had previously taught about the NFA were now required to teach pertinent facts about the FFA and arrange for the disposal of all NFA items (Norris, 1993). It was not until the 1990s that any information pertaining to the NFA was included in the Official FFA Manual (personal communication, A. Larke, Jr. May 31, 2000).

Moore (1999) wrote,

> I can remember the turmoil of the Civil rights era because I was a high schools student when schools were integrated. I personally saw how African-American students were treated and accepted (read "not accepted") into the white society. I experienced the NFA and the FFA merger (it really wasn't a merger, it was a federal government mandated take over). I have reviewed the personal papers of former federal agricultural education officials and know who the racists were… I can remember when there were separate state organizations for the "white" agriculture teachers and for the "black" agriculture teacher. I have read "Forty Long Years" which expresses the African American viewpoint of the NFA-FFA merger and the empty promises made over the years by the federal agricultural education leaders…

Bell, Powers and Rogers (1987) believed that desegregation ended the infrastructure to sustain African Americans in agricultural education. African Americans were apprehensive of being merged out of rather than merged into roles of usefulness and effectiveness (Norris, 1993). African Americans were apprehensive about the merger because throughout history they had never been represented by employment in professional positions in Agricultural Education.

Conclusions, Implications, Recommendations

The NFA was an organization that had a full history of accomplishments and was a thriving organization in 1965 at the time of its merger with the FFA. However, the number of African American males in the NFA in 1965 exceeds the number of African American **males and females** in the FFA today. Therefore, it is recommended that research be conducted to determine what can be done to increase African American participation in the FFA by looking at past activities of the NFA. It is further recommended that additional historical material on the NFA be included in the Official FFA Manual and that a lesson plan on the NFA and its history be developed and disseminated to agriculture teachers.

The infrastructure of African American teachers, state supervisors, and teacher educators in agricultural education that existed prior to 1965 is not nearly as strong today. Therefore, it is critical that all of agricultural education give greater attention to supporting diversity. "We need teachers who will personally make a commitment to reach out to students of color or at least find someone of color for whom they can be a mentor" (Larke, 2000, p.9). It is recommended that teachers make a personal commitment to reach out to students of color or at least find someone of color for whom they can be a mentor. It is also recommended that a study be conducted to determine causes of the decline in African American teachers since the merger.

An implication from these findings is that a merger of equals was in reality a merging out of the NFA. Further implications would be that in order to increase African American membership in the FFA, a greater emphasis on diversity awareness and action must occur and that additional studies should go beyond African American issues to include other underrepresented populations in FFA issues.

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Exploring the Past of the New Farmers of America (NFA): The Merger with the FFA

A Critique

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Contribution and Significance of Research

Change is never without consequences. These consequences are often difficult to measure, and impossible to predict at the time of the change. George Santayana, said "those who cannot remember the past are condemned to repeat it."

It is especially fitting that this historical examination was conducted on this, the 35th Anniversary of the NFA/FFA Merger. Young black people have been joining the merged NFA/FFA organization for five years longer than the total number of years the NFA existed separately. As time marches on for the FFA it may be further separating, rather than uniting, young people with an interest in agriculture. This study provides us with additional evidence of a critical event in the history of the FFA. The authors are to be commended; this study is timely and needed.

There is little doubt in anyone's mind that the rate of change continues to accelerate. The FFA/NFA merger occurred 35 years ago, when biotechnology was still confined to the laboratories of a few scientists and global positioning was accomplished with terrestrial maps. The National FFA Organization has to try to manage this climate of change in such a way as to insure that the FFA remains a vibrant and relevant organization that meets the needs of every young person interested in agriculture. Janus, the Roman god of gates and doors, faced both forward and backward. The leadership of the FFA needs to shape their view of the future by looking back into the past.

That agricultural education, inclusive of the FFA, needs to continue to examine and improve diversity at all levels is beyond question. Diversity is often a contentious issue. The authors are to be commended for undertaking, reporting, and sticking their necks to examine this historical event and the resulting implications for the profession.

Questions for Consideration

The historical method was certainly appropriate to this study. This reviewer wondered if reviewing only records housed by the National FFA constituted a complete review of the available documents? Are you assuming that all NFA records were transferred during the merger?

You cite a single "personal communication" that sheds additional light on the issue. The reviewer then wondered why only a single interview was conducted? Clearly, Dr. Alvin Larke would be an excellent source of information on this topic, but I suspect that he could also direct the researchers to several other people with first-hand knowledge of this historical event. Their first-hand testimony would enhance this research effort, and will continue to become more difficult to secure.

Many of the recommendations were clearly based on the findings, and are likely to improve the practice. However, you recommend that the FFA examine past activities of the

NFA to increase African American participation. This reviewer questions the wisdom of using 35 year -old activities rooted in production agriculture as models to attract new members.

Overcoming Barriers to Learning in Distance Education: The Effects of Personality Type and Course Perceptions on Student Performance

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Abstract

Agricultural institutions represent a unique opportunity with respect to developing a better understanding of the factors that influence distance learners' performance and success. This study is the first step in a multi-phased research effort aimed at conducting analysis over time of compiled secondary data from an agricultural distance education program based at the University of Florida. For this first, pilot stage of the project, secondary data was collected from a graduate level agricultural distance education course delivered via interactive videoconferencing network to both on-site and off-site students. The study was conducted in an attempt to explore how demographic, personality and course perception factors might be related to distance learners' perceptions and performance outcomes, as well as determine whether there were any significant differences in performance and perceptions for on and off campus students.

Results of the study indicated that personality type, as well as perceptions of the instructional techniques used, did affect performance of distance learners. On the other hand, age was the only demographic factor that showed strong correlations with performance and course perceptions. Results of correlational analysis involving the Myers-Briggs personality type scale, which was administered to students in the course during the semester in which it ran, indicated that trait based preferences did correlate with course perceptions, which in turn showed strong association with performance indicators. These findings provided support for the idea that a personality inventory, combined with a set of tested perceptual/attitudinal indices, might well serve as the foundation for a useful assessment tool that could be used to track student progress and potentially indicate the likelihood for success in a given course environment.

Introduction

The traditional university classroom, until recently one of the few places where face-to-face communication was seen as the desired norm, has been undergoing rapid transformation due to the impact of distance education based communication technologies such as compressed video and the Internet. Indeed, corporate management consultants such as Peter Drucker have gone so far as to predict the demise of the traditional university classroom, calling it "inefficient and overpriced" as compared to distance education delivery methods (Bray, 1999). It's undeniable that for many students, particularly adult learners, the opportunity to take a technology based distance education course may be very attractive, even essential to obtaining a degree and achieving professional success. But it's also true that adult distance learners may be very different, from the standpoint of experience, personality and perceptions, than traditional university students. Studies show that most distance learners tend to be adults looking to return to school after an absence or to obtain a credential useful in furthering their careers. Increasing numbers of distance learners are also elderly, minority, disabled and/or English-as-a-second-language students. Studies of distance education student demographics (National Center for Education Statistics, 1998) indicate that a majority (approximately 75%) of adult distance learners are female, are older than traditional students, and live more than 51 miles from the originating campus (Thompson, 1997). In addition, they may have family and work responsibilities that cause them to learn differently, perform differently, and have different perceptions and expectations about the courses they take than traditional students (Sheets, 1992).

Agricultural institutions represent a unique opportunity with respect to developing a better understanding of the factors that influence distance learners' performance and success. As one of the tenets of their mission to provide "life-long learning," land-grant universities and many other agricultural institutions have developed extensive infrastructures to facilitate distance education delivery of courses to a diverse community of learners in geographically varied urban and rural areas (Miller, 1999). Most of these programs involve technological delivery of distance education coursework in a variety of majors at both the graduate and undergraduate levels utilizing teleconferencing, videotape and the Internet. In fact, a study by the National Center for Education Statistics (1998) lists agriculture within the top ten disciplines in terms of development of distance education at the post-secondary institutional level.

Purposes of the Study

A recent article in the Chronicle of Higher Education reported that, although no national data currently exists on distance education student persistence rates, administrators and instructors consistently report course-completion rates of 10 to 20 percentage points below that of traditional students (Carr, 2000). Along these same lines, little research has been devoted to exploring other than demographic factors that might be related to student performance (Cookson, 1989). The research that has been done has concentrated largely on demographic correlates (gender, age, occupation, work experience, and marital status) of student success. Few studies have addressed other factors, such as personality type and perceptions, that may be relevant in terms of influencing student performance and success. This study is the first step in a multi-phased research effort aimed at conducting analysis over time of compiled secondary data from an agricultural distance education program that has been in existence since 1998.

The goal of this analysis is to develop an assessment instrument that can be used to better evaluate students' likelihood of success as they come into the program, as well as track their progress and perceptions of their experiences as they move through the program. For this first, pilot stage of the project, secondary data was collected from one recent and fairly representative graduate level agricultural distance education course delivered via interactive videoconferencing network. The purposes of this study were to 1) utilize existing secondary data to explore those factors that might be related to distance learners' perceptions and performance outcomes; 2) from this analysis, identify and determine the significance of potential factors that might influence students' relative levels of performance.

Literature Review

Literature in the field of distance education is replete with studies to demonstrate the effectiveness of televised instruction in terms of student performance (Chu & Schramm, 1975; Russell, 1992; Whittington, 1987). Whittington (1987) reviewed more than 100 published and unpublished documents on the subject of television's instructional effectiveness and reported television "has no intrinsic effect, for good or ill, on student achievement" (p. 54-55). Russell (1994) cited 44 studies and 21 research summaries from 1954 through 1992, encompassing more than 800 separate studies of instructional levels from elementary through graduate education, that show "no significant difference" in terms of students' grade performance between video-mediated classes and a traditional classroom. Studies over the years have shown that students who have taken technology-delivered courses through various media (computers, videotape, satellite, interactive video) have done as well or better than their counterparts in "traditional" classrooms (Moore & Thompson, 1997). Wright (1998) found that students at remote sites in a video teleconference course actually outperformed the traditional classroom group.

Although not looking specifically at performance, many researchers have used instruments to measure students' attitudes about such topics as the overall distance education experience, technology used, instructional methods, and interaction techniques (Biner, 1993; Diebel, McInnis, & Edge, 1998; Sorensen, 1995). Sorensen (1995) wrote that students' primary complaint was poor reception (video and audio), based on technological constraints. Gray and Miller (1999) found that age appeared to be an attitudinal factor, relating to desired interaction levels in distance education courses distributed by videotape and an interactive video network. Older students placed a higher value on learner-content interaction and learner-interface interaction than did younger students.

Personality type is widely recognized as a determining factor on how people learn (Lawrence, 1997; Myer, McCaulley, Quenk, & Hammer, 1998). Because personality type indicators, such as the Myers-Briggs Type Indicator, are readily available to guidance counselors and professors, the indicator instruments are used to help students identify their personality characteristics. The MBTI is based on four dichotomous preferences: extraversion/introversion, sensing/intuition, thinking/feeling, and judgment/perception. Learners respond differently to educational methods, based on the personality type, especially as the methods relate to the sensing/intuition dichotomy, where sensing types favor collaborative and dependent learning methods and intuitive types prefer holistic and independent methods (Myers, McCaulley, Quenk, & Hammer, 1998). The MBTI has been used to help identify successful high school and at-risk urban community college students (Evans, 2000; Fouts, 2000). Research also has suggested that certain personality types (ISTJ and ISFJ) have a higher graduation rate at universities (Macdaid, Kainz, & McCaulley, 1984). Lynch and Sellers (1996) found that traditional and nontraditional (defined by the authors as 'older age') college students tended to prefer learning environments consistent with their own personality type preferences.

However, there is a lack of research addressing the role of personality as a predictor of achievement in televised courses (Biner, Bink, Huffman, & Dean, 1995). One of the few personality type-based distance education studies used the Sixteen Personality Factor Questionnaire (16PF) to compare final course grades with distance education and traditional education students (Biner, Bink, Huffman, & Dean, 1995). The researchers found that successful telecourse students were more introverted, self-indulgent, and tended to meet their responsibilities in efficient, expedient manners. They suggested that the personality profile of students enrolling in the distance education course differed markedly from the personality profile of traditional college students. The authors also recommended that a personality-testing program be implemented for students to be enrolled in distance education courses and that interventions be conducted for possible low-performing students.

Methods

This study employed a causal comparative analysis using an ex post facto design. To conduct the study, secondary data in the form of student records, course evaluations and results from a Myers-Briggs personality type inventory that was administered to students in the class during the term in which it ran was collected from a population of 40 students enrolled in the graduate level course. The fall 1999 course was a two-way, audio/video class, distributed to eight sites across the state via an interactive videoconferencing network. The class met once a week in a three-hour lecture/discussion format. The instructor taught from the campus interactive video distance education facility location for each class. Students were able to take the course either in the on-campus interactive video distance education facility or at one of the eight remote videoconferencing sites. (In this program, all students, whether on or off campus, are characterized and think of themselves as distance learners, and instructors communicate and evaluate their students in the same way.)

The first course offered in the Professional Master's Degree program utilized a student evaluation of the interactive videoconference technology and distance course delivery. Specific technology-related items addressed factors including picture quality; sound quality; talkback delay; and confidence in the IVN system. Course delivery and management items included enrollment and registration, instructor responsiveness, receipt of course materials, promptness of a back-up tape (when needed), and interaction between students. A second iteration of this instrument added items drawn from Biner (1993) to develop measures of student attitudes and opinions toward televised courses. These items had been analyzed for content validity in televised courses. This second survey instrument raised some faculty concerns over items pertaining to instructor characteristics. Thus, in the third version of the student evaluation these types of questions were removed or modified to focus only on the use of instructional technology, course management and the instructional technique. This became the instrument used in the fourth course that is the focus of this study.

Instrumentation

To conduct the study, data analysis was used to identify relationships among student demographics (including gender, age, on and off campus status); personality type; perceptions of course characteristics (perceptions of instructional techniques, course management/ coordination and level of social interaction) and the key performance indicators of course grade and grade point average (GPA). The perceptual data was derived from the course evaluation instrument that is currently administered to all students enrolled in the program. The Myers-Briggs Type Indicator (MBTI) was used to indicate students' personality type. The instrument used to measure students' attitudes and perceptions toward the technology used in the course was based on Biner's (1993) attitudinal instrument for students in televised courses.

Results

To conduct this analysis, student demographics and course grade and GPA were collected from the university student records system, and integrated into a data analysis package along with students' responses to the MBTI inventory and to 20 relevant items from the course evaluation. To insure confidentiality and anonymity, student identification numbers were converted to case numbers, and these were used to match data files. Since only one student in the sample withdrew from the course after the drop/add period ended, after compiling all data, a final *n* of 39 was achieved. Of that number, 13 of the students included in the sample were male, and 26 were female. The mean age for students in the sample was 33 years (SD=9.5). Seventeen students took the class in the campus distance education interactive video facility, while 22 took the class at one of the remote video conferencing sites. With respect to outcome measures of the course itself, the average course grade was a B+ (SD=2.4), while the mean GPA was 3.47 (SD=.90).

Objective One - Utilize Existing Secondary Data To Explore Those Factors That Might Be Related To Distance Learners' Performance And Course Satisfaction Outcomes.

It was anticipated that results of the study would show significant relationships among student demographics, personality types, perceptions of course characteristics and the performance measures of course grade and GPA. To initiate this analysis, principle component factor analysis using varimax rotation was used as a data reduction technique on students' responses to the 20 relevant items from the course evaluation survey. The resulting three-component solution loaded 15 of the items on three factors, accounting for 77% of the total variance. The items that did not load were the specific technology items (quality of picture; quality of sound, etc.). These items were not included in the analysis. The resulting three principle components were composed of from three to eight perception-oriented statements. The resulting variables were subsequently constructed as indices and coefficient alpha reliability estimates calculated as follows: instructional technique perceptions (r = .88); course management/coordination perceptions (r= .73) and level of social interaction perceptions (r=.67). Table 1 lists the three principle components, the individual items in each component and *n*, mean and standard deviation for each item.

Table 1.
Principle Components of course evaluation survey.

Item #	Abbreviated Variable Label	n	M	SD
Perceptions of Instructional Technique		**31**	**3.60**[a]	**.86**
1	Technology helped in delivery of material	30	3.87	1.01
2	Presentation materials aided understanding	30	3.73	.94
3	Instructional techniques aided understanding	29	3.52	.95
4	Students felt they "belonged"	30	3.53	1.22
5	Technology encouraged class participation	30	3.27	1.23
Perceptions of Levels of Social Interaction		**31**	**4.15**	**.84**
8	Interaction of instructor/students and student/student between sites	30	3.87	1.01
12	Accessibility of instructor outside of class time	25	4.72	.54
13	Ability to interact with students outside class	30	4.23	1.04
Course Management		**30**	**3.85**	**.62**
10	Helpfulness of site coordinator/facilitator	29	3.52	.99
11	Room held free of distractions	31	3.39	.99
14	Promptness which materials were delivered/sent	31	4.10	.94
15	Delivery promptness of backup tape	28	3.40	1.07
16	Availability of academic advising	28	3.86	1.11
17	Class enrollment procedures	15	4.40	.99
18	Registration procedures	26	3.88	.95

[a] 1 = very poor, 2 = poor, 3 = average, 4 = good, 5 = very good.

Bivariate correlations were subsequently run and a correlation table developed indicating variables with significant correlations. Table 2 displays these results, indicating that for the independent variable gender, significant correlations existed with perceptions of instructional delivery and course management; on and off campus status was significantly correlated with perceptions of instructional techniques and level of social interaction; and age was significantly correlated with course grade and GPA, as well as with the perceptual indices instructional technique, course management and level of social interaction.

Table 2.
Correlations of demographic variables to performance and perceptions.

	Grade	GPA	Instructional tech.	Course management	Interaction
Gender	.00	.09	.41**	.44**	.19
On/off campus	.12	.17	.58***	.31	.50
Age	.47**	.52***	.60***	.47**	.52**

** (p < .05)   *** (p < .01)

As for personality type, Table 3 displays the correlation table showing significant correlations by personality type. Results indicated that, for introvert types, perceptions of instructional technique were strongly correlated to course grade and GPA, while for extrovert types, perceptions of instructional technique were strongly correlated, and perceptions of course management and level of social interaction were moderately correlated to course grade and GPA. For intuitive types, perceptions of instructional technique were also strongly correlated to course grade and GPA, and perceptions of course management were moderately correlated. Perceptions of level of social interaction were moderately correlated to course grade, but not to GPA. On the other hand, for sensing types, only perceptions of instructional technique were strongly correlated to course grade and GPA.

For thinking types, as well as for perceiving types, none of the perception indices were correlated to performance, and for thinking types, there seemed to be almost no association at all. For judging types, perceptions of instructional technique were strongly correlated to course grade and GPA, perceptions of course management were moderately correlated and perceptions of level of social interaction were moderately correlated to course grade, but not to GPA.

Table 3.
Correlations of perceptual indices and performance indicators for MTBI personality type Preferences.

Personality Type	Factor	Grade	GPA
Introvert			
	Instructional Technique	.74**	.74**
	Course Management	.46	.48
	Social Interaction	.37	.42
Extrovert			
	Instructional Technique	.84***	.73***
	Course Management	.60**	.67**
	Social Interaction	.59**	.52**
Intuitive			
	Instructional Technique	.85***	.88***
	Course Management	.62**	.67**
	Social Interaction	.66**	.54
Sensing			
	Instructional Technique	.74**	.76***
	Course Management	.43	.38
	Social Interaction	.31	.42
Thinking			
	Instructional Technique	.19	.26
	Course Management	.02	.12
	Social Interaction	.04	.08
Feeling			
	Instructional Technique	.86***	.73**
	Course Management	.72**	.70**
	Social Interaction	.67**	.62**
Judging			
	Instructional Technique	.89***	.79***
	Course Management	.62**	.68**
	Social Interaction	.59**	.47
Perceiving			
	Instructional Technique	.56	.41
	Course Management	.24	.04
	Social Interaction	.12	.13

* p < .05).   *** (p < .01).

Objective Two - From This Analysis, Identify And Determine The Significance Of Potential Factors That Might Influence Students' Relative Levels Of Performance

To achieve this objective, two priori hypotheses were developed, based on an assumption that there would be a significant difference in course performance between MBTI personality types, and that personality types would interact with perceptions of instructional technique, course management and level of social interaction. To conduct this analysis, univariate ANOVA was run, using MBTI preference type as between subjects factor and each of the perceptual indices as a covariate. ANOVA results showed a main effect for perceptions of instructional technique, F (1, 20) = 23.05, $p < .02$, and a two-way interaction between extrovert/introvert types and thinking/feeling types F (1, 20) = 3.88, $p < .05$, as well as between extroverts/introverts and judging/perceiving types F (1, 20) = 5.73, p, .04. Figs. 1 and 2 show graphs of the means plots for the interaction effects.

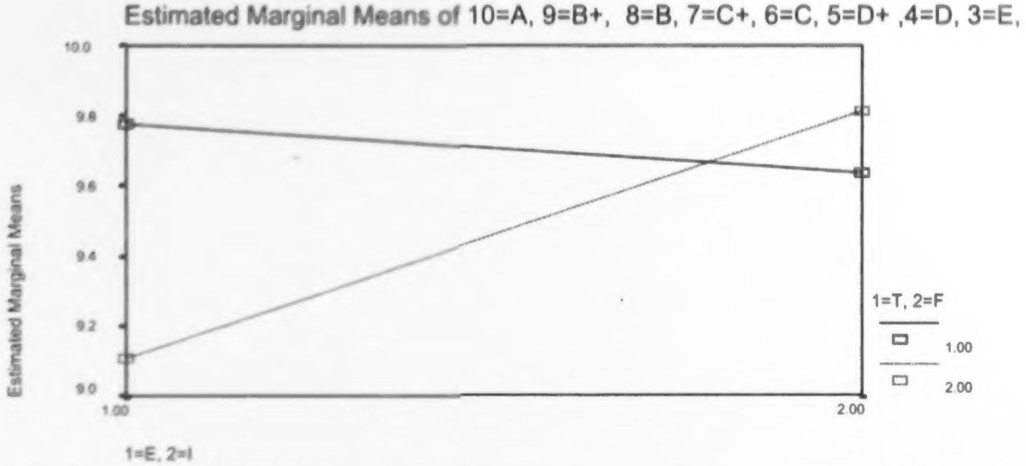

Fig. 1. Differences in Course Performance Between Extrovert/Introvert Types and Thinking/Feeling Types

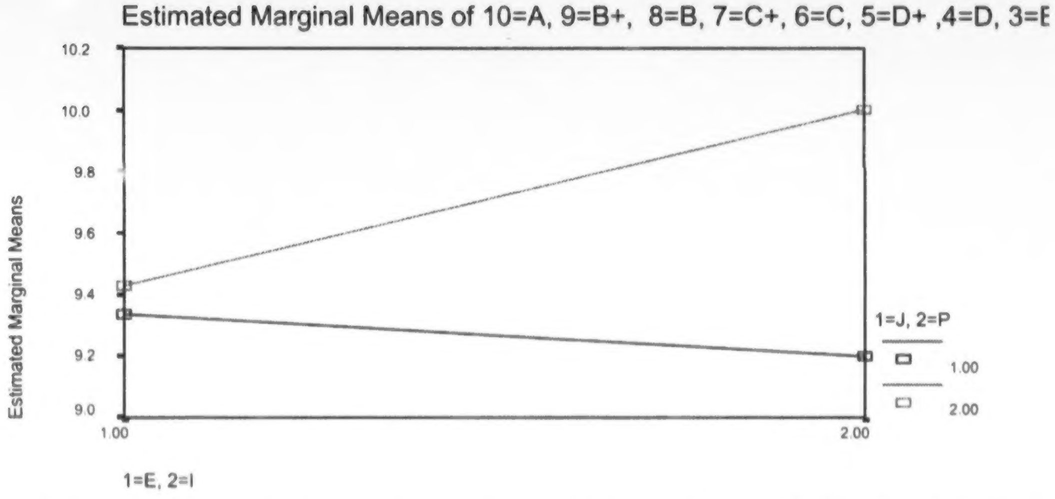

Fig. 2. Differences in Course Performance Between Extrovert/Introvert Types and Judging/Perceiving Types

ANOVA results for the effect of perceptions of course management F (1, 20) = 3.52, p < .07, and level or social interaction F (1, 20) = .40, p, .5 were not significant.

Discussion

Willis (1992) is one of many researchers who have observed that, in the distance setting, learning is a dynamic process, the success of which is a function of the communication and interaction that takes place between instructor and learners. Looked at in the context of performance, it is quite possible that perceptions of the level and quality of the social interaction present in a distance education course, as well as of the instructional techniques used, might influence not only attitudes but also performance of distance learners. The results of this study provided support for this argument.

The results of the correlational and ANOVA analysis involving the MBTI personality type scales also proved to be interesting. Trait-based preferences did appear, in some cases, to generate course perceptions that showed strong association with performance indicators, providing support for the idea that a personality inventory like the MBTI, combined with a set of tested perceptual/attitudinal indices, might well serve as the foundation for a useful assessment tool that can be used to track student progress and potentially indicate the likelihood for success in a given course environment. Institutions such as Texas Tech University and Texas A&M University are currently exploring the possibilities of developing such an inventory for use in their distance education programs.

Interestingly, of the demographic variables that were studied, only age showed strong correlations with both performance indicators and course perceptions. This could be related to on/off campus status, since the off site students tended to be older by about 10 years than the on site students. Given the small sample size, further segmentation of demographic variables was not feasible, but would certainly be warranted in a larger sample. In addition to sample size, one of the chief limitations of the current pilot study was that it was based on analysis of a single course, thus limiting gneralizability to other course environments. One of the objectives of subsequent research will be to look at differences with respect to other courses, as well as in computer course environments. Computer anxiety and learning styles have been researched (Stegall, Newman & Raven, 1999; Stegall, Raven & Newman, 1999) but no consensus was reached if there was a relationship between learning style and relieving perceptions of computer anxiety.

Implications and Recommendations

One of the key findings of this study has to deal with the implication that performance outcomes for distance education students are closely related to perceptions that may be a function of a constellation of factors. Prior experience, pre-existing attitudes and beliefs all may play a role in determining whether a student will be successful, and /or able to deal successful with the realty of a distance education experience. Further, innate traits, such as personality, obviously affect the level of perceptions a student may generate about his or her experience, as well as affect the student's ability to cope with life circumstances that may or may not be conducive to the learning experience. When confronted with lemons, some make lemonade, as they say, but not all of us come equally equipped, in terms of our cognitive and affective orientation, to do so. Based on the results of this study, it could be argued that personality and perception are key determinants of the successful distance learning experience.

In terms of agricultural distance education, these findings may indicate a need to look at the distance education course advisement/evaluation process more closely. As agricultural distance education programs expand and grow, it seems to be time to adopt a more research-based approach to the assessment process. Implementation of instruments that can assess student potential for success as they come into a distance education program, and that can be used as a self-diagnostic tool by students to ascertain whether a particular program or course experience is right for them seem to be timely, and may represent a more efficient way of helping students establish a "fit" with their distance education program.

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Overcoming Barriers to Learning in Distance Education: The Effects of Personality Type and Course Perceptions on Student Performance

A Critique

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Contributions and Significance of Research

The results of this study adds some to the body of knowledge surrounding the use of personality types and course perceptions. Studying student personality types and their perceptions in relation to distance education course barriers is interesting and adds to extensive research already completed. The study points out the limited availability of national data on persistence rates for distance education students. Universities offering distance education programs and courses know that completion rates of distance education students are lower than those on campus students. These completion rate types of studies, actually reports, are published each term by those universities offering courses via distance education or distance delivery.

Procedural Considerations

The study was well designed and conducted in meeting the researcher objectives. It was evident from examining the related literature that an adequate theoretical base has been developed. The statistical methods identified in the study were appropriate for this causal comparative analysis study.

Questions for Consideration

What is different with this study and many other studies conducted using personality type indicators? What does this study really tell us about barriers to distance education? Could not your results be said of every student not just distance education students? Is not personality type a key determinant in the success of every student that attends a university?

An Evaluation of a Multidisciplinary Course Delivered at a Distance: Prescriptive Principles to Challenge our Profession

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Abstract

Most of our universities are using, or exploring the use of, distance education as a delivery system for courses, degrees and continuing education. Texas A&M University-Kingville Citrus Center was awarded a USDA Challenge Grant to develop a new course: *Phytochemicals in Fruits and Vegetables to Improve Human Health*. This course, delivered in spring, 1999, was the first in the nation to combine experts from chemistry, plant physiology, horticulture, plant breeding, food science, plant pathology, biochemistry, postharvest physiology, and the medical sciences in the discussion of phytochemicals. Distance learning technology provided the conduit for interaction between 18 faculty/researchers across the nation and a diverse group of learners in 10 videoconferencing sites. Weekly topics and discussion were delivered via the Trans-Texas Videoconference Network (TTVN) with course handouts and PowerPoint slides available on a course Web site. The primary objective of the course was to provide opportunities for students to acquire interdisciplinary knowledge related to the effect of fruits and vegetables on human health. A second objective was to make students aware of careers in health-related interdisciplinary fields, and increase their knowledge and understanding of the relationships between research findings and the practical use of phytochemicals. The purpose of this evaluative research study was to analyze how well the course, as designed and delivered, met the course objectives. What were the student perceptions of this multi-teacher, multi-location (distance education) approach? Could prescriptive principles for effective use of distance education be developed to serve as an instructional model for the delivery of agricultural science courses? Formative and summative evaluations were collected on-line and stored in a database. An external evaluator observed the course and kept a field journal, compiled numerical ratings and completed the constant comparative method to integrate categories on all open-ended responses. The most beneficial component of the course was access to national experts/presentations and the relevancy of research applications to a geographically dispersed audience. Only through distance education was this approach possible. The initial evaluative results were useful for the future revision of this course and can be applied to other courses and programs. This evaluative study highlights numerous challenges facing our profession. Agricultural educators can become the leaders in methodologies for the effective and efficient design, delivery, and evaluation of distance education as a conduit for agricultural and life sciences content.

Introduction and Theoretical Framework

The study presented here pertains to lessons learned from organizing and teaching one multidisciplinary course delivered at a distance. It is an initial effort to provide "food for thought" as we conduct further research on the effectiveness of different approaches to distance education.

Why Distance Learning?

Most of our universities are using, or exploring the use of, distance education as a delivery system. "Major organizational changes and new developments in higher education are being accelerated by dynamic advances in global digital communications and increasingly sophisticated learning technologies….Barriers to accessing higher education learning opportunities are being reduced globally because of improved learning technologies" (Hanna, 1999, p. 19). The movement of higher education institutions to utilize technology to deliver education is often the result of administrative decisions to reach a broader audience in an efficient manner. Resources have been and are continuing to be put in place for high-speed Internet connections and interactive videoconferencing. Specifically, continuing education, academic courses, and full degree programs are being developed to meet demands from individuals seeking non-traditional access.

Many institutions question the "quality" and rigor of distance education programs and courses and compare "traditional" classrooms to technology-mediated delivery. Many researchers argue that these comparative studies are of little or no value. The predominance of "no significant difference" findings has led them to conclude that delivery systems do not matter (Russell, 1996). "Comparative studies of mediated education do not address the question of quality of learning and teaching in the right frame. These studies are grounded in the mechanical view of mediated communication and the physical science paradigm of educational technology" (Saba, 1999, p. 29). Clark (1983) argued that media were mere vehicles used to deliver instruction and that it is the method rather than the media that affects learning. Research that considers the use of "systems approaches" to describe distance education and define a set of prescriptive principles for its effective use are necessary (Saba, 1999; Smith & Dillon, 1999a). "A systems theory of distance education helps us understand that 'distance' is not a product of geography, but rather it is a function of the relationship between structure and dialogue" (Smith & Dillon, 1999b).

Why a Phytochemicals Course?

Historically, consumption of certain fruits and vegetables was thought to prevent or cure ailments ranging from headaches to heart diseases. In fact, early medicine revolved largely around the prescription of specific plant food concoctions for certain health disorders (Darby, Ghalioungi & Grivetti, 1977; Kohman, 1947). In the history of mankind, there has always been the awareness that the composition and quality of the diet have a strong impact on maintaining good health. Parents encourage children to eat fruits and vegetables because they help the children "grow big and strong." However, only one percent of children from two to 19 years old meet the U.S. Department of Agriculture's dietary guidelines (Munoz, Krebs-Smith, Ballard-

Barbash & Cleveland, 1997).

Until relatively recently, these attributes of fruits and vegetables were based more on metaphysical beliefs than on scientific evidence, but during the past decade many studies examined the relationship between the consumption of fruits and vegetables and human health. Besides being the main source of dietary fiber and vitamins, fruits and vegetables contain more useful compounds, including a myriad of phytochemicals or bioactive compounds shown to have anti-inflammatory, antioxidant, and healing effects. These include carotenoids, flavonols, flavones, tocopherol, selenium, phenols, protease inhibitors, organosulphur compounds, limonoids, and plant sterols (Potter & Steinmetz, 1996; Fahey, Zhang & Talalay, 1997).

The National Academy of Science released an important report on *Diet, Nutrition and Cancer* (Commission of Life Sciences, 1982). This report emphasized the relationship between diet and cancer and offered specific dietary suggestions. The Surgeon General's Report on Nutrition and Health in 1988 revealed that five of every 10 deaths in the U.S. were attributed to diet-related diseases. The strategy in the war against human diseases needs to be revised. A major emphasis on prevention rather than cure needs to be implemented through education in agriculture and food science curricula. Even though we have evidence suggesting the importance of fruits and vegetables, there were no specific courses designed to teach students about the phytochemicals contained in fruits and vegetables.

Background, Course Objectives, and Purpose of the Evaluative Study

In the fall of 1998, Texas A&M University-Kingville Citrus Center was awarded a USDA Challenge Grant to develop a new course: *Phytochemicals in Fruits and Vegetables to Improve Human Health*. This course, delivered in spring, 1999, was the first in the nation to combine experts from chemistry, plant physiology, horticulture, plant breeding, food science, plant pathology, biochemistry, postharvest physiology, and the medical sciences in the discussion of phytochemicals. Although it was designed as a graduate-level course, upper-level undergraduates and professionals in the field seeking continuing education credit also participated. Interaction among 18 instructors and 32 students at 10 videoconference locations (within three university systems) was accomplished via an interactive video network. Phytochemical information was delivered through PowerPoint® presentations, slides, demonstrations, video clips, and discussion. Course handouts and PowerPoint slides were provided to learners on a course Web site (http://phytochemicals.tamu.edu). A basic premise of the course design was to shift significantly away from the traditional lecture style by one instructor to a learning environment enhanced by distance education with several instructors. As described in *Everybody Counts*, the teacher's role should shift to that of consultant, moderator, and interlocutor, not just presenter and authority (National Research Council, 1989).

Course Objectives

The primary objective of the course evaluated was to provide opportunities for students to acquire interdisciplinary knowledge related to the effect of fruits and vegetables on human health. A second objective was to make students aware of careers in health-related interdisciplinary fields, and increase their knowledge and understanding of the relationships between research findings and the practical use of phytochemicals.

Study Purpose

The purpose of this evaluative research study was to analyze how well the course, as designed and delivered, met the course objectives. What were the student perceptions of this multi-teacher, multi-location (distance education) approach? Could prescriptive principles for effective use of distance education be developed to serve as an instructional model for the delivery of agricultural science courses?

Methods

Because of the unique challenges of a multidisciplinary approach coupled with the use of distance-learning technologies, educational evaluation (with both numerical and open-ended responses) was the method employed (Borg & Gall, 1989). A formative evaluation was administered to determine 1) the effectiveness of the presenters, 2) students' understanding of content presented, 3) usefulness of supplemental materials, 4) the quality of the videoconference transmission, and 5) whether students perceived the "right mix" of interaction between the lecture and discussion components of the course. These data were collected voluntarily through the course Web site and stored in a database; therefore, the number of responses for each topic varied. One "field" in the database collected the location of the learner to determine if there were differences based upon site (although there was no "local" site as presenters were also physically dispersed). The means for the numerical ratings were calculated for each question. Students were also asked for "responsive evaluation" (Stake, 1967) on the most and least beneficial aspects of each session.

At the conclusion of the course, an open-ended, on-line evaluation was collected and standard course evaluation forms were administered at the Texas A&M University System sites (College Station and Weslaco). These data were not available for those enrolled in other university systems or for continuing education credit.

An external evaluator observed the course and kept a field journal about the learning environment, compiled numerical ratings, and used the constant comparative method to 1) compare incidents applicable to each category and 2) integrate categories on all open-ended responses (Lincoln & Guba, 1985; Glasser & Strauss, 1967). All on-line responses were coded to ensure confidentiality and stored in a database on the server of the external evaluator.

One of the limitations of this study was the difference in purpose or distinction between "research versus evaluation" (Coldeway, 1988).

> Evaluation, as described in the evaluation literature, is an attempt to determine the worth, quality, or value of something. It can be done for the purposes of improvement or to describe the final outcome. It is not typically concerned with prediction or control of variables that generalize beyond the primary setting….Evaluation can be quantitative or qualitative and need not be overly concerned with issues typically important in research approaches that are designed to test hypotheses of theoretical constructs. Evaluation must be built into the distance education development process in almost every case and should not be viewed as an extra cost or activity that serves little purpose" (Coldeway, 1988, p. 49).

Therefore, this study provides a "lessons learned" framework for sharing the results of a multi-disciplinary approach to distance education. "Using a systematic approach to instructional design and delivery will naturally lead to evaluation and should raise questions about overall effectiveness" (Coldeway, p. 51).

Findings

The findings are divided into four sections: 1) *Formative Data* with numerical averages for each topic and integrated categories for all open-ended responses, 2) *Summative Data* of open-ended responses collected on-line at the completion of the course, 3*) Standard Course Evaluation* forms administered through The Texas A&M University System only, and 4) *Discussions of Results* drawn from the data analysis.

Formative Evaluation Numerical Ratings and Discussion of Open-Ended Responses

For each topic throughout the semester, students were asked to complete an on-line evaluation instrument (with 1 being the lowest and 5 the highest) for the following questions: 1) How would you rate this presenter (preparedness, enthusiasm, delivery techniques)?; 2) How well did you understand the content?; 3) Did the supplemental materials help (PowerPoint slides, other visuals, handouts)?; and 4) How would you rate the videoconference transmissions (audio, video, interaction with other sites, etc.)? The students were also asked, "Did the session have the right mix of lecture and discussion/interaction" and this could be indicated by a "yes" or "no" answer (see Table 1). Following these five questions were three open-ended questions: 1) What was the most beneficial part of the presentation? 2) What was the least beneficial part of the presentation? and 3) Other comments or recommendations.

In addition to the numerical ratings, the open-ended responses were analyzed and integrated into the following six categories: 1) presenter qualities, 2) student understanding, 3) effectiveness of supplemental materials, 4) quality of videoconference transmission, 5) most beneficial, and 6) least beneficial aspects of the course. Student responses on *presenter qualities* included: clear pronunciation, detailed presentations, good discussion of complex subject matter, thorough coverage of content, interesting content, scientific application, outstanding preparation, excellent overview, willingness to answer questions, knowledgeable about subject matter, genuine interest, enthusiasm, humor, and using real research data to demonstrate principles. *Student understanding* was enhanced when presentations integrated discussion and "real-world" applications according to respondents. The *supplemental materials* considered useful were 35mm slides, handouts, bar graphs, visual aids of actual objects, lecture notes/PowerPoint slides and video segments.

Table 1
Numerical Averages on Formative Evaluation (Scale: 1=lowest - 5=highest)

Topic	*Presenter Rating*	*Student Understanding*	*Supplemental Materials*	*Videoconference Transmission*	*Right Mix % "yes"*	*Number of Respondents (n)*
antioxidants	3.9	4.1	3.4	3.9	86%	7
beta-carotene	4.3	4.2	4.2	4.5	100%	11
cancer chemo-prevention	4.0	3.5	3.8	2.5	50%	4
carotenoids	4.6	4.2	4.5	3.8	100%	14
citrus limonoids	3.8	2.9	2.8	3.1	60%	15
community-based programs	3.8	4.3	3.3	3.4	88%	16
crucifers	3.8	3.8	3.4	2.4	82%	17
designer fruits	4.2	4.1	4.2	4.4	100%	9
diet & prostate	3.9	3.2	3.3	3.1	60%	10
flavonoids	4.4	4.0	4.2	3.8	80%	5
isoflavones	3.8	4.0	3.8	3.3	100%	8
myristicin	3.6	3.6	3.8	3.2	80%	5
nutrition & cancer	3.8	3.5	4.0	3.2	55%	28
onion & antiplatelet	4.7	4.5	4.4	4.1	100%	10
wine & health	4.4	4.4	4.5	4.3	91%	11
AVE	**4.1**	**3.9**	**3.8**	**3.5**	**82%**	**11**

It was important in this context to separate *videoconference transmission* from content presentation. Most of the time, the interactive video provided an appropriate conduit for the course delivery, but there were some sites that were not connected the entire time of a session. There were frequent audio difficulties, often caused by connection problems, a lack of facilitation/technician assistance at distance sites, misunderstandings about muting functions, and by some speakers who did not speak directly into the microphones. Visuals were often hard to read on the TV monitors and students wanted to see the speaker more often than the visuals during the presentations.

Overall, the *most beneficial* component of the course was the diversity of speakers/presentations and the relevancy of research applications. The *least beneficial* aspects primarily stemmed from the nature of the seminar format. Some students commented that there was too much detailed information (especially chemistry). Many of the presenters were from international origin and on occasion were difficult to understand. PowerPoint slides downloaded from the course website were not in the same order as given in the presentation because of intellectual property concerns, causing some student confusion. Some presentations were perceived to lack clear organization and appeared rushed, especially when there were two speakers for one class session. Speakers often prepared so much material that there was no time for breaks or class discussion, thus causing frustration and information overload.

Summative Evaluation Based upon Open-Ended Responses

At the conclusion of the course, students were asked to complete an on-line, open-ended, evaluation instrument. This summative evaluation included eight questions and the opportunity to add additional comments and suggestions. Eight respondents completed the summative evaluation. These questions and a summary of comments are documented in this section.

1) In your opinion, was distance education an effective way to deliver this course? Although students mentioned some obstacles to the videoconference delivery (especially audio as mentioned previously), students felt that it was interesting to have speakers from all over the nation and to be able to reach a diverse audience of learners. The interaction with multiple sites and diverse speakers and students was unique and a strength of the course. One student commented, "With the speakers being dispersed, this was the only way to offer a course of this type."
2) Should this type of technology be used in the future? Every respondent agreed—this technology allowed more speakers to come together and offer their knowledge and expertise to a wider audience.
3) If you took this course with an instructor in the traditional classroom, do you think you would have gained more knowledge? This question had a mixed response. Those who said, "yes" felt the course was too intense, especially in a three-hour, once-a-week format. They suggested a shorter time frame with more frequent meetings. The issue of "accents" of the speakers was mentioned as a barrier to learning, this being intensified by the audio difficulties experienced with videoconferencing. Those who answered, "no" once again emphasized the ability to garner knowledge from instructors all over the US with diverse research backgrounds compared to the knowledge base of one instructor in the traditional classroom.
4) Did the topics enhance your understanding of phytochemicals in fruits and vegetables? The answer unequivocally was "yes."
5) Were there topics needing to be covered that were not? Answers varied based upon the diverse nature of the student backgrounds. Topics mentioned were processing effects on each of the chemicals' dietary aspects, ethnobotanical or historical aspects, and less on specific foods and more on phytochemicals *per se*.
6) Were there any topics covered in too much detail? Many students mentioned that the course included too much chemistry and biochemical structures. Some felt there was a bias toward citrus and others felt there was too much information on growing crops and plant diseases rather than the aspects of phytochemicals in relation to health issues.
7) Would you recommend this course to others? Once again every respondent said "yes" but they did mention that perhaps it should be limited to graduate students or those who have a pre-requisite of biochemistry/chemistry.
8) What suggestions for improvement would you make? Answers varied and many have been mentioned previously: course was too intense in a 3-hour block; need to have local

facilitators; implement more written assignments and fewer exams; make sure speaker slides are in the order they will present and formatted for TV monitor display; provide technical support for correcting transmission difficulties; create a manual that lists foods and phytochemicals as a course reference; if the course continues to have a broad audience, then have less detailed content; provide streaming video of lectures over the Internet; and provide review questions before or right after the lectures.

Standard Course Evaluation Results

Standard course evaluation forms were administered for The Texas A&M University System with 14 respondents -- Kingsville (Table 2) and College Station (Table 3). The instruments had different questions and will be discussed separately. Both forms used a 1-5 scale with 5 being the "best" or "strongly agree."

At Texas A&M University – Kingsville, the seven respondents were all graduate students with three indicating that this course would be used in their "major." The others listed it as an "elective" course.

There was also an open-ended question on the Texas A&M University - Kingsville form, "Please give your views on the quality of the learning experience in this course. In your comments, please include both strengths and weaknesses." Student responses were overwhelmingly positive. "There should be more courses like this! Not only the subject matter, but the format (teleconferencing links to multi-educational sites, with the experts in their fields)." "This course was very informative. The material taught was very new…a new concept in the way scientists are approaching killer diseases. This is very exciting because scientists are starting to look around at our environment and are going back to plants for cures."

Several students mentioned the technical difficulties with the videoconferencing, but did not imply that it was a hindrance to learning. "There are still some technical problems regarding [interactive video]; if we can resolve that in the future it would be much better." "Once technical problems are worked out, there shouldn't be any more problems!"

At Texas A&M University in College Station, the seven respondents were also all graduate students with a mix of those who took the course because it was required and those who chose it as an elective. Students at Texas A&M University – College Station also had the option to provide additional comments. On the "most positive aspects of this course" several students commented on the ability to "know the newest knowledge and to know what the scientists are doing!" "Speakers shared the most updated information—I feel very informed." "The different instructors with different backgrounds made the course very interesting." On "how you would improve this course," students mentioned the need for a textbook or another reference and again mentioned some frustration with the videoconference delivery.

Table 2
Texas A&M University – Kingsville Student Evaluation Results

Question	*Rating*
This course promotes a challenging learning environment for students.	4.86
This course inspires high academic standards and goals in students.	4.71
An atmosphere of mutual respect and civility is encouraged in this course.	4.86
The subject matter in this course is presented in a clear and organized manner.	4.71
Tests and other requirements cover the course material as stated in the syllabus.	4.86
The grading system outlined in the syllabus is followed.	4.71
The instructor is accessible outside of class.	4.86
Lectures and discussions focus on the material outlined in the syllabus.	4.86
The results of tests and assignments are returned in a reasonable time.	4.86
The textbook(s) and/or other required materials contribute to my understanding of the subject.	4.86
Students are offered help and encouragement in this course.	4.71
A student's ability to think (analytically, critically, creatively, etc.) is enhanced by the experience of this course.	4.86

Discussion of Results

Evaluation data are commonly used in the constant revision, refinement, and improvement of courses. Embracing Farhad Saba's view of a "systems theory of distance education," researchers should consider the complexity of educational research and the use of a variety of data sources. In order to capture the effectiveness of distance education as a delivery system when teaching complex content to a diverse audience, a variety of formative and summative data collection procedures were used. Although the overall student response rate was low with weekly collection, the researchers needed to "snapshot" individual speakers/topics for course evaluation. We also needed to separate ineffective teaching techniques from the technology delivery system and determine if there were differences in these perceptions based upon locations.

Based upon the course objectives, students acquired interdisciplinary knowledge related to the effect of fruits and vegetables on human health, interdisciplinary career choices, and the relationships between research findings and the practical use of phytochemicals. Distance education served as an effective dissemination tool for the course content. Student numerical ratings and comments support these findings. In comparing data at different site locations and standard course evaluation for this course compared to other horticulture graduate courses delivered in a "traditional format," there was no difference in student outcomes and attitudes about the course. Although there were some technical difficulties, distance education was not a barrier to learning.

Table 3
Texas A&M University – College Station Student Evaluation Results

Question	*Rating*
I would take another course from this professor.	4.14
The instructor was consistently well prepared and well organized for class.	4.00
The exams/projects were presented and graded fairly.	4.71
Help was readily available for questions and/or homework outside of class.	4.29
The instructor stimulated my interest in the subject.	4.14
The instructor had a thorough knowledge of the subject.	4.29
The instructor kept students informed of their progress	4.43
The instructor treats students with respect.	4.57
Reading assignments and homework contributed positively to the learning experience.	4.57
I learned to apply principles from this course to new situations.	4.57

Implications & Recommendations

While this project was funded through a USDA Challenge Grant, what elements can be transferred to other courses delivered via distance education? One part of evaluation is sharing "lessons learned" and developing strategies to solve, or resolve, these issues.

Even with all the training and logistical planning provided to develop and deliver this course, reliance on presenters to provide appropriate visuals for videoconferencing was a problem. Because of copyright/intellectual property issues with "cutting edge" research, the presenters were concerned about including all the data slides on the course Web site. The team decided to exclude certain slides and this caused greater frustration and confusion for the students because the slides were not "in order." Now that we have the "content" collected and permission granted on course materials, we plan to re-format for distance education delivery and develop more Web-based/CD-ROM components to the course. This should help correct many of the transmission difficulties due to videoconferencing to multiple locations. We also plan to include fewer speakers and less didactic instruction, to allow more time for discussion and application/synthesis of the content.

The data-gathering procedures on-line worked well. In the future, we will not need weekly formative evaluation (perhaps only once or twice during the semester) and that should improve the number (and consistency) of responses. Having undergraduate, graduate, and continuing education students together was a challenge, but also provided a unique perspective to course content. We intend to continue to advertise the course to a diverse audience, but will require some pre-requisites or background reading and/or textbook to help provide a context for the course.

Regardless of the content being delivered, can agricultural educators help define the "prescriptive principles" for effective use of distance education? Here are some recommendations based upon our course evaluation to start this dialogue:

1. METHODS: It is not the *media* that makes the difference, it is the *methods* employed. "Students learning at a distance have the potential to learn just as much and as well as students taught traditionally" (Schlosser & Anderson, 1994). The students enrolled in *Phytochemcials* learned the course material and met the course objectives. Because of the nature of the content and guest speaker approach, this course primarily used lectures with supplemental visuals. Our profession needs to determine the *most effective* instructional methods for teaching agricultural content at a distance.
2. INSTRUCTIONAL DESIGN: This course used a multi-instructor, multi-site, multi-media format. Agricultural educators can help other content areas within our colleges and universities to design distance learning experiences that will maximize learning. We know that *interactive* environments improve retention and transfer. Our profession can be the leader in the design and adoption of student-centered instructional design models appropriate for distance education and other forms of experiential learning.
3. ASSESSMENT STRATEGIES: The educational evaluation technique, with both numerical means and open-ended responses, provided appropriate feedback for the revision and improvement of this course. By collecting data throughout the course or program, and asking questions that were content specific as well as "technology" specific, the researchers were able to separate knowledge/skills acquisition from the distance education delivery system. Our profession needs to develop appropriate evaluation and outcome assessment mechanisms to determine "effectiveness" of delivery strategies.
4. TEAM APPROACHES: Teaching at a distance takes more preparation/development time and expertise. Our team included the logistical leader (planning the content and speakers), a dissemination specialist (designing the course Web site), and an evaluation specialist (designing and collecting the on-line data). Our profession needs to continue to embrace team approaches and help to design distance education "templates" that improve effectiveness and *efficiency*.

In conclusion, the most beneficial component of the course was the diversity of speakers/presentations and the relevancy of research applications to undergraduate, graduate, and continuing education students. Only through distance education was this approach possible. The initial evaluative results were useful for the future revision of this course and can be applied to other courses and programs.

This evaluative study highlights numerous challenges facing our profession. Agricultural educators can become the leaders in methodologies for the effective and efficient design, delivery, and evaluation of distance education as a conduit for agricultural and life sciences content.

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An Evaluation of a Multidisciplinary Course Delivered at a Distance: Prescriptive Principles to Challenge our Profession

A Critique

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Contributions and Significance of Research

The results of this study give us the opportunity to ask some tough questions concerning the use of distance education or distance delivery in course delivery. Offering courses via distance delivery is not an inexpensive mode but a mode that takes time and resources away from other areas within the university. Another tough question is the "quality" issue as it relates to course content and structure. As pointed out in the research paper quality and rigor are often mentioned as factors as to why not to offer distance delivered courses.

Procedural Considerations

This evaluative research study was well designed and conducted in meeting the researchers purposes and objectives. It was evident from examining the related literature that a limited amount of research is available to adequately defend the use of distance education in many situations. Adequate evaluative methods utilized in the study were appropriate for this research study.

Questions for Consideration

Are faculty being offered training on how to properly and efficiently develop courses for distance delivery? If so, are administrators and students alike being instructed on how to properly access and utilize materials from a distance? Do students have access to additional resources when taking distance delivered courses at your university? If so, what are these and how often are they accessed?

In the three studies from Texas I have some questions that need to be answered concerning your infrastructure. As you are delivering the courses via distance delivery techniques has your university structure changed to accommodate the needs of distance delivery? Such things as personal communication tools and applications, network of networks for web based courses or web based campus, dedicated servers and software applications for distance delivery, and software applications and services for those away from your campus structure. Just how has the physical campus infrastructure changed to accommodate the use of distance delivery of courses?

Perceived Strengths, Weaknesses, Opportunities, and Threats that Impact the Diffusion of Distance Education Technologies for Colleges of Agriculture in Land Grant Institutions

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Abstract

Land grant institutions have traditionally sought to bring education to the people. Many Colleges of Agriculture have been dedicating resources to high-speed Internet connections and interactive videoconferencing to meet demand from individuals seeking non-traditional access. As these programs are implemented, understanding perceptions, concerns, and interests regarding distance education (DE) technologies can facilitate the diffusion of DE technologies throughout the institution to enhance student learning while maintaining employee engagement and satisfaction. The purpose of this study was to determine the strengths, weaknesses, opportunities, and threats associated with using distance education (DE) technologies in a College of Agriculture at a land grant institution from the perspective of administrators, faculty, and support units. Rogers' *Diffusion of Innovation* (1995) served as the theoretical underpinnings for the study. Qualitative research (naturalistic inquiry) was employed and the constant comparative method was used for data analysis (Lincoln & Guba, 1985). Analysis revealed that respondents perceived various organizational strengths and recognized the opportunity to utilize DE technologies to improve instruction and reach new audiences through collaboration and new courses/programs. A need was expressed to expand policies/procedures to address critical issues (i.e., incentives, support, training, quality control, careers, and communication channels). Competition, dependency on outside assistance, and misinformation on the Internet were perceived as organizational threats. Based on Rogers' attributes (1995), it was concluded that the rate of adoption of DE technologies could be enhanced through revised policies/procedures and the development of strategies to address critical issues. The three major recommendations to diffuse DE technologies are: 1) administrative support, 2) training, and 3) incentives. Administrative support would include student/technical support and providing a seamless infrastructure and "virtual presence" for the distant learner. Training should not only include technology exposure, but instructional design, pedagogy/andragogy, and "cook-book" strategies and "how-to" manuals. Support extends beyond "verbal" to providing the support/professional staff to assist. By providing incentives such as release time, mini-grants, continuing education stipends, and recognition in the promotion and tenure process, faculty will have more than verbal encouragement to continue, or begin, using distance education technologies and will have the reason to do so. Analysis of an organization's strengths, weaknesses, opportunities, and threats provides a framework to review and improve strategies to encourage the diffusion of DE technologies in the most efficient and effective manner to ensure the creation of the desired future.

Introduction & Theoretical Framework

Land grant institutions have traditionally sought to bring education to the people. Many Colleges of Agriculture have been dedicating resources to high-speed Internet connections and interactive videoconferencing to reach more people through distance education. Specifically, continuing education, academic courses, and full degree programs are being developed to meet demand from individuals seeking non-traditional access. As these programs are implemented, it is important to determine administrative, faculty, and support unit perceptions, concerns, and interests regarding distance education (DE) technologies. This understanding can facilitate the diffusion of DE technologies throughout the institution to enhance student learning while maintaining employee (administrator, faculty, and staff) engagement and satisfaction.

The theoretical foundation for this study stems from Rogers' diffusion of innovation research. Rogers defined an *innovation* as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (1995, p. 11). "*Diffusion* is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p. 5). The innovation-decision process is the "process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 1995, p. 20). There are also influences on the process, such as the prior conditions, characteristics of the decision-making unit, the perceived characteristics of the innovation, and communication channels.

Rogers (1995) discussed five attributes that impact the rate of adoption: 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability. "Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 1995, p. 212). Many change agencies use incentives to increase the rate of adoption. The main function of an incentive is to increase the degree of relative advantage. The second attribute, compatibility, "is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 1995, p. 224). The third attribute, complexity, "is the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 1995, p. 242). The rate of adoption is slower with more complex innovations. The fourth, trialability, (sometimes called divisibility) "is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried on the installment plan are generally adopted more rapidly than innovations that are not divisible" (Rogers, 1995, p. 243). The last attribute, observability, "is the degree to which the results of an innovation are visible to others" (Rogers, 1995, p. 244).

Distance education technologies continue to increase rapidly in power while decreasing in cost. As a result, there is a synthesis of computers and telecommunications and the growing affordability of sophisticated technology for instruction (Dede, 1989; Kelly, 1990). In addition, the advancement of fiber optics is driving the emergence of new devices that increase the historic capabilities of computers and telecommunications. Communication by electronic transmission is increasing to establish new connections between educators, students, and resources (Collins, Veen, & DeVries, 1993; White, 1983). Computer-mediated communication is facilitating instructional content, information services, dialogue exchange, collaborative teamwork, and problem solving from a distance (Hudspeth, 1990; Hunter, 1990; Kamper, 1991; Willis, 1991).

"The view of distance education as an innovation provides an important means for understanding the phenomena of distance education, particularly from the perspective of those upon whom its acceptance depends: the faculty" (Dillon & Walsh, 1992, p. 6). How people perceive and react to these technologies is far more important than the technical obstacles in influencing implementation and use. These perceptions and reactions are not known, therefore, this study chose to explore how people perceive and react to DE technologies in determining the rate of diffusion of this innovation.

Purpose & Research Questions

The purpose of this study was to determine the strengths, weaknesses, opportunities, and threats (SWOT Analysis) associated with using DE technologies for a College of Agriculture at a land grant institution from the perspective of administrators, faculty, and support units. Strengths and opportunities, including perceived benefits, promote the diffusion of DE innovations while weaknesses and threats hinder diffusion. Three research questions were developed to guide the study:

1. What were the perceived strengths and opportunities expressed by the respondents?
2. What were the perceived weaknesses and threats expressed by the respondents?
3. How did the perceived strengths, weaknesses, opportunities, and threats impact the rate of adoption of distance education as an innovation?

Methodology

This study used an alternative to the traditional positivistic view of research, which states that the ideal "is the formulation of general laws, laws that we hope are universal. The essential feature of such laws is that they be context independent, free of the specific constraints of any particular context and therefore applicable to all" (Mishler, 1979, p. 2). Investigators in educational research have increasingly begun to propose alternative approaches that are more appropriate to the study of meaning in context (Bronfenbrenner, 1977; Mishler, 1979). This study employed the alternative approach of naturalistic inquiry as the methodology.

Respondents were selected using the snowball sampling technique (Babbie, 1989) in which individuals were interviewed based upon recommendations from the original interviewees. The process began with a high level official within the College of Agriculture who mentioned key employees who were leaders in using distance education. The interviews continued until the researchers felt there was a consensus of information and redundancy in responses. A total of 42 interviews were conducted. The interviewees consisted of 16 administrators, 15 faculty members, and 11 support unit employees. Total respondents consisted of 8 females and 34 males. Approximately half (22) of the respondents were professors, 7 were associate professors, 1 was an assistant professor, 1 held the title of research assistant, and 11 were professional staff.

All respondents were familiar with distance education technologies (i.e., interactive videoconferencing, Internet, CD-ROM, etc.).

Respondents were coded to ensure confidentiality, with the letters indicating a departmental abbreviation and the numbers corresponding to the sequence of the interview within a department. Nine individuals were nominated but failed to respond to persistent correspondence. See Table 1 for a list of respondent codes and group affiliation.

Table 1. Group Affiliation and Respondent Codes, 1999 (N=42).

Group	Codes Included
Administration (A)	ED2, EC1, SC1, BB1, RP1, WS1, AN1, EN4, RE1, EG1, PP3, HS2, EG3, FS1, EG5, HS3
Faculty (F)	HS1, PS1, ED1, PP1, CM1, PP2, WS2, AN3, AN4, AN2, EN3, EN2, EG4, EG2, HS4
Support Units (S)	ODE1, OC1, ODE2, DE1, OC2, DE1, OC2, OC3, DE2, OC4, EN1

According to Warwick (1973), "every method of data collection is only an approximation of knowledge. Each provides a different and usually valid glimpse of reality, and all are limited when used alone" (p. 190). For this study, the researchers used a variety of qualitative methods to ensure truth value, applicability, consistency, and neutrality (Erlandson, Harris, Skipper & Allen, 1993, pp. 133-161): 1) *Prolonged Engagement* - The researchers interviewed respondents from August – December, 1999. Interviews typically ranged from 30 minutes to 1½ hours. 2) *Interview Protocol Development* was based on the review of the literature, specifically with regard to procedures for a SWOT Analysis (Goodstein, Nolan & Pfeiffer, 1993) and diffusion of innovations (Rogers, 1995). 3) *The Interview Process* served as the primary data collection instrument. Individuals were asked probing questions to gather descriptive information. The interviews were semi-structured with each interview beginning with a brief explanation of the reason for the meeting. Questions included items such as "How do you see this technology impacting your department?" and "In relation to distance education technologies – what strengths, weaknesses, opportunities, and threats do you see?" Interviews were reconstructed using field notes. 4) *Member Checking* was done throughout the interview by asking for verification or clarification of the information. 5) *Triangulation* was used to verify the data. A variety of people with varying perspectives were interviewed over the four-month period. In addition to interviews/field notes, some respondents provided additional documents that were reviewed. The researchers also used triangulation in analyzing the data based upon the theoretical framework (Rogers, 1995). 6) A *Reflexive Journal* and *Audit Trail* included interview scheduling, logistical information, insights/reflections, methodological decisions, and respondent codes to document original data sources.

The constant comparative method was used for the data analysis (Lincoln & Guba, 1985, pp. 339-344). This method includes four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. For the first stage, the researcher studied the detailed field notes to determine trends in the data from the varying perspectives. Each idea (unit) was initially listed, without placement into categories. The investigators drew upon tacit knowledge in making these initial judgments for early category formulation. Colored markers were used to differentiate respondent themes so that the data would remain in context and provide visual indications of emerging categories.

"The first rule of the constant comparative method is that while coding an incident for a category, compare it with the previous incidents in the same and different groups coded in the same category. This constant comparison of the incidents very soon starts to generate theoretical properties of the category....Thus the process of constant comparison stimulates thought that leads to both descriptive and explanatory categories" (Lincoln & Guba, 1985, p. 341). From this process, the researchers established categories across the data set.

For the second stage of the constant comparative method, a peer debriefing was conducted in February 2000 with the distance education workgroup within the Department of Agricultural Education. This group was familiar with distance education issues at the university level, but was not interviewed in the study. This session and subsequent e-mail correspondence allowed the researchers to test emerging categories and move into the next stage of the constant-comparative method. As the data analysis progressed, the researchers were able to combine and more specifically define categories based on overlying themes in the data. Once the categories emerged, fewer modifications were required as more data were processed. Delimiting the construction occurred as the data sources became saturated and the categories were integrated.

Findings and Conclusions

1. What were the perceived strengths and opportunities expressed by the respondents?

Within the context of a SWOT Analysis, strengths and opportunities refer to those things that currently exist within an organization and those things that have not been realized but may be able to be taken advantage of to achieve the organization's desired future, respectively. Evaluation and synthesis of the responses revealed topics related to technology, audiences, content, the institution, enhancement of teaching, and collaboration.

There were seven primary categories related to strengths that surfaced out of comments provided by the interviewees. The first category addresses the **continuous improvement of distance education technologies** as a fundamental strength. "The Web is the primary strength - we can deliver anything, anywhere, anytime" (OC2). The second category focuses on the **ability to reach new audiences and existing demand** for particular content. Respondents expressed this in both specific terms (i.e., "urban population" (EN3), "workshops" (PP3)) and broad terms (i.e., "teach more students" (EG2), "contact a greater number of people" (AN3)) . The accessibility created by the technology was perceived by the respondents to allow nontraditional students to be reached (FS1, EN4, EN3, HS2, EG3, PP2, AN3, EG2, AN2, PP3). Respondents indicated that audiences were comfortable with technology (HS4) and that in some cases demand for particular topics exceeded what could be handled with traditional delivery (HS4). **Presence of early adopters and proximity to technology** encompasses the third category. "Faculty [who] are bent on technology" (EC1) was perceived to encourage adoption of the technologies. In addition, having an interactive videoconference room in the building (PP3) was a perceived strength in that it facilitated the use of the technology.

The fourth category focuses on the **reputation for quality content** at the institution. "[The institution] is well known for its' expertise and has a reputation for quality" (ED1). The institution was also noted to have "well-defined content experts" (ED2) and "unique content" (ED1). The **extensive infrastructure and network** of the institution serves as the fifth category. It was noted by the respondents that the "state and international network that has been established" (ED2) was an important strength. The sixth category involves the **use of technology to enhance teaching and learning**. Respondents indicated "delivery will become more and more sophisticated" (PP2) "making teaching more effective" (FS1). Multiple technologies to improve teaching and learning were mentioned by the respondents. "E-mail" (AN2, EG2), "electronic bulletin boards" (EG2), "animations" (EG4), and "graphics" (EN2, EN1) are examples. One of the prevalent aspects was providing students access to information. "References and resources" (EG4), "old tests" (EN3), "support material" (SC1, EN4), and information in general (EG1, EN1, EN3) were specifically stated. "Convenient" (EG2, EC1, RP1, PP2, EN3) access to the information was perceived to be a significant strength. The final category focuses on **administrative encouragement and support**. Respondents indicated that "support from administration to do these types of things such as online development" (PS1) and "Department Head support" (WS2) were strengths within the organization.

In relation to opportunities, there were five primary categories that surfaced out of comments provided by the interviewees. The first category focuses on **expansion of the audience base to reach nontraditional students**. Respondents indicated that opportunities are being created for students who cannot come to campus for courses and degrees (EN1, EG2, AN4). Geographically, respondents indicated the opportunity to reach potential students internationally (PS1) and specifically in Latin America and across the state (ED1). The opportunity to reach all people in a new way (SC1, HS3, EG3, FS1, EN3) (i.e., "older students" (RP1), "inner-city youth" (HS2), "county extension agents" (FS1)) was expressed as a significant opportunity. Continuing education (HS1, DE2, OC2, WS1, EC1, EG5, HS4, HS3, EG2, HS2) was specifically addressed. "Profit-driven topics can feed back into the classroom" (HS4).

The second category relates to the **expansion of collaboration with private and public institutions.** Respondents indicated that distance education technologies were providing opportunities to collaborate across educational institutions (HS1, FS1) (i.e., "public schools" (ED2), "community colleges" (HS3), system schools (BB1, AN1, AN2, PP3)) and to partner with the private industry (EG4, PP2). The opportunity to **create an individualized and enhanced interactive learning experience** defines the third category. "Students have grown up with computers and are expecting this" (EN1). Distance education technologies are creating opportunities to enhance courses (ED2), "peak students' interest" (AN3), and provide higher levels of training (CM1, EN3). In addition, communication through e-mail is providing opportunities for students to ask things they would not ask in class (AN3). "The teacher can become a facilitator of learning" (HS4).

The fourth category focuses on the opportunity to **provide unique and specialized courses/programs**. Because "graduate students already know how to learn, there is a lot of opportunity at the graduate level with Master degrees" (EG4). In addition to Master's programs (HS1, WS1), respondents indicated opportunities in Extension (HS2) and undergraduate programs (WS1). The concept was mentioned that smaller programs could exist by pooling students from multiple locations (EG4). The final category relates to the **advancement of technology**. "The future is in web-based delivery" (DE1). As bandwidth issues continue to diminish (EG5) with the advancement of desktop videoconferencing (AN2, PP2) and better technologies (AN1), instantaneous delivery (EG3) will create opportunities.

The above stated findings lead one to conclude that respondents perceived that administrative encouragement and support, extensive infrastructure, and reputation for quality content will facilitate the use of DE technologies. It can be concluded that respondents perceived the opportunity to utilize new technologies to improve the delivery of instruction and expand that delivery to new audiences. Collaboration with other institutions to offer new courses and programs can facilitate these opportunities. A summary of the perceived strengths and opportunities can be found in Table 2.

Table 2. Categories of Strengths and Opportunities Expressed by Respondents, 1999 (N=42).

Strengths	**Opportunities**
• Continuous improvement of DE technologies	• Expansion of audience base to reach nontraditional students
• Ability to reach new audiences and existing demand	• Expansion of collaboration with private and public institutions
• Presence of early adopters and proximity to technology	• Create an individualized and enhanced interactive learning experience
• Reputation for quality content	• Provide unique and specialized courses/programs
• Extensive infrastructure and network	
• Use of technology to enhance teaching and learning	• Advancement of technology
• Administrative encouragement and support	

2. What were the perceived weaknesses and threats expressed by the respondents?

Within the context of a SWOT analysis, weaknesses and threats refer to those things that currently exist within the organization and those things that, while not realized, can prevent the organization from achieving its desired future, respectively. Evaluation and synthesis of the responses revealed topics related to incentives, expertise, communication channels, administrative and student issues, competition, and job security.

In relation to weaknesses, there were seven primary categories that surfaced out of comments provided. The first category focuses on **limited incentives, development support, and funding**. Incentives for faculty to participate in distance education course development were predominant weaknesses mentioned by the respondents (PP1, ED1, HS1, OC4, CM1, WS1, EC1, SC1, WS2, EN4, PP3, HS2, EG4, HS4, HS3, PS1, PP2). "Just because it is a good thing --

is not enough of a reason" (HS3). A number of respondents indicated that they felt that participation in distance education course development should be included in the review process (WS2, HS3, EG3). Lack of development support (ED1, DE1, PP2, WS2, FS1, EC1) and resources to participate (OC4, RP1, PP2, WS2) were also noted as weaknesses. As three respondents stated, "There is no time to do this" (ED1, OC4, WS2).

The second category focuses on **limited knowledge regarding copyright and intellectual property**. Respondents indicated that a need existed to inform faculty regarding copyright issues (HS3) and legal aspects (EN3) involved in delivering distance education courses. The third category focuses on **weak communication channels**. Respondents indicated that only limited information was available regarding distance education courses (DE1, EC1, PS1). In addition, the procedures to conduct a distance education course (PS1), the availability of support (EG2, DE2, RP1), and the administrative vision (DE2, PP2, EC1, ED2, HS1, RP1) is not readily known.

The fourth category relates to **slow action on critical issues**. Respondents indicated that the need to standardize distance education delivery (AN2, DE2) and coordinate efforts (WS2) had not been addressed. In addition, respondents perceived that slow action in regard to incentives, support, and funding issues created an inherent weakness. The fifth category relates to the **current technological limitations**. "Technologies come with baggage to work out" (AN4). Technology issues, such as bandwidth limitations and availability, are perceived as weaknesses (FS1, EG4, OC2, PP3). The speed of technological change (EN1) itself creates a weakness. **Lack of skill, expertise, and desire to develop interactive DE courses** is the sixth category. Respondents indicated that they lacked the expertise required to create distance education courses (EG2, EC1, FS1) and that "you need a desire to do this kind of thing" (WS2). The final category relates to the **loss of interaction**. Disconnect between students and faculty was indicated as a significant weakness (AN4, EN4, EN2, EG2, RP1, SC1, AN1, EN3, EG1). The idea that students would have to be self-motivated in order to succeed at distance education courses was expressed because it was perceived that the interaction with the faculty and other students created motivation (AN4). The loss of extracurricular activities commonly called the "other" education was also perceived to be a significant weakness (AN4, RP1).

In relation to threats, there were six primary categories that surfaced out of comments provided by the interviewees. The first category focuses on **career and job security**. One respondent posed the question, "As faculty, are we safe to do this in a career?" (PS1). Faculty reviews are based on the number of publications produced, not on teaching techniques (CM1, EN1). Additionally, the extent to which the web circumvents the role of educators (OC4) and the issue of intellectual property (FS1) were mentioned. If courses are stand-alone, administration could try to downsize faculty (WS2, AN4). The second category relates to **competition from private and public institutions**. The statement, "If we don't do it - someone else will" (HS3, ED2, RP1, HS1, WS1) was a predominant threat expressed. Respondents felt that there could be a "threat to the long-term survival of the university" (HS1) in that students could go elsewhere (OC4) and thus create business/revenue issues (FS1). The overall institutional threat (EG5, HS4, PP3) from other universities (RP10) and the private sector (HS4) was mentioned. The third category relates to **dependency on outside developers/programmers and security concerns**. Respondents indicated that there is a danger in external groups developing courses for you because you become dependent on them (HS1). In addition, the potential for content information to be edited by hackers (OC2, AN3) was also cited as a threat. **Quality measurement issues** constitute the fourth category. One respondent asked the question, "What does this mean for quality education down the road?" (SC1). The idea of losing one's focus on the content by being distracted by the technology was a concern in that quality would be lost (AN3, DE2). "If it is not done right - you lose your reputation" (PS1). The fifth category relates to **using old models to develop new policies**. Respondents indicated that institutional treatment of academic and outreach programs should not be treated the same (HS2). The limited motion forward (ED2) and poor response time (ED2) associated with "weakness-related" issues (i.e. incentives, support, etc.) created an inherent threat to diffusion. Lack of new policies related to procedures for students to take DE courses (AN2), coordinating board issues (EG5), and lack of a communicated commitment (HS2) regarding the new delivery mechanisms creates a threat. The final category relates to **misinformation on the Internet**. Respondents indicated concern regarding misinformation (OC2, EN1, EN4, EG4) due to the ease of publishing and lack of peer review often inherent on the Internet.

Based on the findings, it can be concluded that respondents perceived a need for the organization to expand policies and procedures to address issues related to incentives, support, training, quality control, careers, and communication channels. It can also be concluded that respondents believed that competition, dependency on outside assistance, and misinformation on the Internet are threats to the organization's ability to achieve its desired future. A summary of the perceived weaknesses and threats can be found in Table 3.

Table 3. Categories of Weaknesses and Threats Expressed by Respondents, 1999 (N=42).

Weaknesses	**Threats**
• Limited incentives, development support, and funding • Limited knowledge regarding copyright and intellectual property • Weak communication channels • Slow action on critical issues • Current technological limitations • Lack of skill, expertise, and desire to develop interactive DE courses • Loss of interaction	• Career and job security • Competition from private and public institutions • Dependency on outside developers/ programmers and security concerns • Quality measurement issues • Using old models to develop new policies • Misinformation on the Internet

3. How did the perceived strengths, weaknesses, opportunities, and threats impact the rate of adoption of distance education as an innovation?

Based on the Innovation-Decision Process (Rogers, 1995), all of the respondents can be classified at the "implementation" stage of diffusion. The respondents were the innovators/early adopters as the result of snowball sampling. Their reflections were based upon how to diffuse distance education across the institution.

The rate of adoption of an innovation (DE technologies) is influenced by the perceived characteristics of the innovation itself. In this study, respondents described distance education technologies to have some degree of "relative advantage." The respondents indicated that they recognized the usefulness of the technologies (i.e., accessibility to information, improving the teaching and learning experience, reaching more students, etc.); however, they also indicated that using the technologies required increased time and effort and were not rewarded.

In relation to the attribute of "compatibility," it is important to note that adoption of the DE technologies was perceived by the respondents to benefit the administration more so than the faculty. "There are too many students already -- why do we want to gain more at a distance?" (PP1, ED1). The idea is raised that unless there is an incentive to use the technology it will not be compatible because there is no perceived "need." Past experiences for the respondents involved interaction with students on a face-to-face basis. The idea to replace face-to-face interaction with communication through technology is not perceived to be compatible (AN4, EN4, EN2, EG2, RP1, AN1, SC1, AN3, EN3, EG5, EG1).

The respondents' perception of the "complexity" of distance education technologies is illustrated by the strong expression of the need for support (ED1, DE1, PP2, WS2, FS1, EC1) and training (WS1, RE1, EG3, EC1, FS1). The respondents perceived "use" to be something more complex than something they can handle on their own. Additional complexity relates to logistical issues expressed by the respondents, such as student registration and reporting procedures (DE1, EC1, HS2).

The respondents' perception of the "trialability" of distance education technologies varied, depending on the type of technology. The use of two-way interactive video conferencing is perceived to require special skills that cannot be implemented incrementally (PS1). In relation to web-based technology, respondents implied that it can be done -- but it "takes time to do it right" (ED1, OC4, WS2, BB1).

"Observability" was perceived to increase when there was a "champion" of distance education technologies in the department or unit. In addition, it was apparent that the proximity of a video conferencing room to a department increased respondents' willingness to participate. Respondents perceived that distance education takes extensive time and effort but is not recognized or rewarded. This lack of recognition and reward impacts the "observability" aspect of the diffusion of distance education technologies.

Based on triangulation of Rogers' attributes (1995), it can be concluded that respondents did perceive distance education technologies to have a "relative advantage;" however, because there are limited incentives or requirements regarding use, respondents did not see it being "compatible" with their current situation. Because respondents perceived the "complexity" of the technologies to include policy related issues, and the "trialability" of the technology to be limited due to required time and effort, the "observability" aspect of diffusion is impacted, thus negatively affecting the rate of diffusion.

Recommendations & Implications

Recommendations and actions (changes) can be implemented to diffuse distance education in higher education settings, specifically within Colleges of Agriculture at land grant institutions. Based upon the attributes of an innovation (Rogers, 1995), it is clear that an incentive structure must exist in order to increase the "relative advantage" of using distance education. Incentives could include release time, faculty workload adjustments, DE fees distributed back to units/departments, salary supplements, and providing expertise such as media experts/instructional designers to assist in converting courses to DE technologies.

For "compatibility," distance education must be viewed as being consistent with the existing values, past experiences, and needs of potential adopters. Respondents in this study mentioned limited administrative vision and support. Having technical infrastructure alone does not ensure the diffusion of an innovation. The need for policies and procedures that are "seamless and transparent" to the distant learner for admission, registration, financial aid, technical support, etc. must also be institutionalized and communicated. Additionally, instruction is currently delivered primarily using lecture formats. Distance education requires a new assessment of how we teach and learn—often requiring time-intensive instructional design on the part of the faculty member.

The "complexity" of the use of technology for teaching and learning is often difficult to overcome. Just when a faculty member has mastered a technology, it changes! The learning curve on some technology (i.e., videoconference equipment and basic presentation software) is much less complicated than other authoring programs that allow the creation of a highly interactive on-line course. One recommendation would be to train faculty, staff, and students on the less complicated software/applications and provide technical expertise through development centers on the more complicated technologies. Faculty could then focus their time and effort on content conversion/delivery and sound instructional design, not on mastering the technology.

"Trialability" is the degree to which an innovation may be experimented with on a limited basis. A faculty member can start the diffusion process by simply converting documents into digital formats/presentation software to use in the traditional classroom. Once these items are converted, displaying the material over TV monitors in an interactive video classroom and posting them on a course website is a logical next step. The complete re-design of lecture into interactive modules can then follow.

For "observability," those who are using DE technologies must be recognized through awards and grants to encourage these efforts among other faculty. Institutions should establish multiple communication channels (i.e., listservs, newsletters, etc.), workshops, presentations, and demonstrations to "show and tell" others about the impacts of distance education on teaching and learning. Opinion leaders and change agents can be strategically placed throughout departments and units to help those who would like to "try" this new and innovative way of teaching. In addition, incentives put in place should be communicated clearly.

The three major recommendations to diffuse DE technologies are: 1) administrative support, 2) training, and 3) incentives. Administrative support would include student/technical support and providing a seamless infrastructure and "virtual presence" for the distant learner. Training should not only include technology exposure, but instructional design, pedagogy/andragogy, and "cook-book" strategies and "how-to" manuals. Support extends beyond "verbal" to providing the support/professional staff to assist. By providing incentives such as release time, mini-grants, continuing education stipends, and recognition in the promotion and tenure process, faculty will have more than verbal encouragement to continue, or begin, using distance education technologies and will have the reason to do so.

Colleges of Agriculture at land grant institutions that are currently moving into the realm of distance education can benefit from the findings presented in this study. The importance of incentives cannot be overlooked by administration. The quote, "Just because it is a good thing – is not enough of a reason" (HS3), expresses it quite concisely. Land grant institutions have been in existence since 1862. Thus, a multitude of policies, procedures, and strategies have been established. As institutions enter and continue to move through the new paradigm of distance education, policies, procedures, and strategies must be reviewed and revised to ensure that critical issues are addressed. Administrators, faculty, and support units must develop strategies related to distance education that are clearly communicated to all participants. Analysis of an organization's strengths, weaknesses, opportunities, and threats provides a framework to review and improve strategies to encourage the diffusion of DE technologies in the most efficient and effective manner to ensure the creation of the desired future.

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Perceived Strengths, Weaknesses, Opportunities, and Threats that Impact the Diffusion of Distance Education Technologies for Colleges of Agriculture in Land Grant Institutions

A Critique

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Contributions and Significance of Research

The results of this study add to the body of knowledge surrounding the use of distance education in Land Grant Universities. Meeting the needs of non-traditional students is and always will be an important function of the university system. Offering courses via distance education is becoming much more common place by educators throughout the world. This research paper describes how valuable support is from administration is in delivering distance courses. This study was used to identify strengths and weaknesses of distance delivered courses.

Procedural Considerations

This adaptive naturalistic inquiry study was well designed and conducted in an appropriate manner to meet the researchers purposes and objectives. It was evident from examining the related literature that an adequate and defensible theoretical base has been developed. The interview techniques and coding methods identified in the study were appropriate for this adaptive naturalistic inquiry study.

Questions for Consideration

Are universities offering distance delivered course just because it is the in thing to do for students? Are teaching faculty given any training in distance delivery techniques prior to course delivery? Are administrators and faculty aware of the design strategies and differences for distance delivered courses? What I really want to know is does offering a course via distance delivery make a difference in what the student is learning and how much they retain?

In the three studies from Texas I have some questions that need to be answered concerning your infrastructure. As you are delivering the courses via distance delivery techniques has your university structure changed to accommodate the needs of distance delivery? Such things as personal communication tools and applications, network of networks for web based courses or web based campus, dedicated servers and software applications for distance delivery, and software applications and services for those away from your campus structure. Just how has the physical campus infrastructure changed to accommodate the use of distance delivery of courses?

Interest in Online Leadership Education and Implications for Instructional Design Strategies

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Abstract

This study was conducted to determine student interest in taking a course through the Internet, rather than meeting in a traditional face-to-face classroom. Further, it sought to identify student characteristics that influence interest in taking a course through the Internet and to identify instructional design considerations based on importance placed on various features by students. The need for this study arises from the demand for particular courses, specifically AGED 340 "Professional Leadership Development". Leadership skills are essential for everyone, both as members and leaders of groups (Gatchell, 1989). Effective leadership is an especially acute issue in modern American society given its increasing complexity and fluidity and its myriad social, economic, political and educational problems" (1995, p.2). As a result, the demand for AGED 340 surpasses the capacity within the Department of Agricultural Education. A June 1998 survey found that computing and information technology are "core components of the campus environment and classroom experience" (Green, 1998). "The World Wide Web provides a powerful new resource for education in agriculture and the life sciences" (O'Kane & Armstrong, 1997, p.10). This new resource, the Internet, is providing opportunities to reach more students in innovative and creative ways, however, the need to utilize alternative methods of delivering leadership education to meet demand is accompanied by the responsibility to assess student interest in these methods and consideration of preferred instructional design strategies. This study used the descriptive survey method to address these issues. Study results revealed that more than 80% of the students would be interested in taking one or more courses through the Internet. No significant relationships were discovered between any of the students' personal characteristics examined and interest in taking Internet-based courses. Scheduled meetings, audio, and graphics were indicated by students to be important components of an online course. Findings support the concept that we must continue to strive to take complicated parts of a body of knowledge and break them down by using graphics and audio to provide learning opportunities. In addition, the value of simulations and animations in instructional design should be examined for their effect on learning and used appropriately. It is important to remember that as noted in an article by Madjidi, Hughes, Johnson, and Cary (1999) one needs to not replicate the traditional classroom, but create a more learner-centered approach. This study provides baseline information that can assist in the development of an online leadership course to meet current needs.

Introduction and Theoretical Framework

Leadership skills are essential for everyone, both as members and leaders of groups (Gatchell, 1989). Madeleine F. Green (1992) observed that while many people learn leadership as they go, in an unplanned and serendipitous way, it is also possible not to learn from experience or by observing others. She concludes, "The central question, then, for developing effective leadership is how can these efforts be made deliberate and purposeful rather than accidental or serendipitous" (p. 59). It is widely agreed by leadership scholars that leadership can be taught (Bennis, 1989; Bass & Avolio, 1994; Kouzes & Posner, 1987). In its guidebook for leadership development, the Higher Education Research Institute states, "Higher education has a vital role to play in educating each new generation of leaders. Effective leadership is an especially acute issue in modern American society given its increasing complexity and fluidity and its myriad social, economic, political and educational problems" (1995, p.2).

As a result, many universities have developed courses that teach leadership theory and practice. Agricultural Education 340, "Professional Leadership Development," is an upper-level leadership course taught at Texas A&M University. This course consists of two one-hour lectures and a one-hour small group laboratory per week. Leadership concepts are introduced during the lecture period and laboratories provide the opportunity to apply the concepts. Agricultural Education 340 is a required course for the approximately 800 students in the Department of Agricultural Education and Agribusiness Majors in the Department of Agricultural Economics. The course is also listed as a Social Sciences elective in Texas A&M's core curriculum. As a result, 40% of the students enrolled in Agricultural Education 340 each semester are not required to take the course, but take the course as an elective. Approximately 650 students complete the course annually. Currently, the demand for the course surpasses the capacity within the Department of Agricultural Education. There exists a need for alternative methods of delivering leadership education to meet this demand.

"The World Wide Web provides a powerful new resource for education in agriculture and the life sciences" (O'Kane & Armstrong, 1997, p.10). This new resource, the Internet, is providing opportunities to reach more students in innovative and creative ways. Instruction delivered via a computer has been shown to be effective in engineering, microbiology, anatomy, and medical education programs (Fasce, Ramirez, & Ibanez, 1995; Inglis, Fu, & Kwokchan, 1995; Jones & Kane, 1994; Tothcohen, 1995). This delivery method has been developed to permit individuals to learn facts and analyze decisions in areas such as farm safety, landscape design, and construction. In addition, in a book entitled The No Significant Difference Phenomenon, Russell (1999) presented 355 studies showing that there is no significant difference between achievement of students who received instruction in a traditional classroom and those who received instruction through other means. Thus, it can be theorized that instruction delivered via a computer can be effectively used to deliver other topics.

A June 1998 survey found that computing and information technology are "core components of the campus environment and classroom experience" (Green, 1998). As noted by Willis in "Effective Practice: The View from Across the Nation" (1998), teachers need to serve as facilitators instead of instructors in order to be successful in delivering instruction online. While other studies have asked the question, "should we deliver instruction using the Internet," they have failed to determine the level of interest held by students in regard to taking a course using these means and, more importantly, to determine factors that can affect the quality of the instruction delivered. Thus, the need for the study reported here.

Purpose and Objectives

The purpose of this study was to identify student interest in participating in an upper-level undergraduate course, AGED 340, "Professional Leadership Development," and other college courses through the Internet and to identify factors to consider when designing instruction for Internet-based courses. The specific objectives of the study were as follows:

1. To determine the interest of students in taking a course through the Internet, rather than meeting in a traditional face-to-face classroom.
2. To identify student characteristics that influence interest in taking a course through the Internet.
3. To identify instructional design considerations based on importance placed on various features by students.

Methods and Procedures

Research Design

The research design used for the study was a descriptive survey method.

Population and Sample

The population for the study consisted of 240 students enrolled in Agricultural Education (AGED) 340, "Professional Leadership Development," during the Fall 1999 and Spring 2000 semesters at Texas A&M University in College Station, Texas. The sample included the 166 students who self-selected to complete the survey that was made available on the Internet.

Instrumentation

The researchers developed the survey instrument in consultation with test development experts. Faculty within the Department of Agricultural Education at Texas A&M University reviewed the instrument for face and content validity. Approximately 50 students reviewed the instrument for readability and understanding. The instrument contained seven questions to identify personal characteristics, three questions to identify interest in non-traditional courses, five questions related to computer experience, fourteen questions related to instructional design preference, and thirty-five Likert-type questions related to instructional design and online learning. The response choices for the Likert scales were: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Unsure/No Opinion," 4 = "Agree," and 5 = "Strongly Agree." The survey concluded with two open-ended questions related to students' perceptions concerning the benefits and drawbacks of Internet-based courses.

Cronbach's Coefficient Alpha was used posthoc to quantify internal consistency of the Likert-type portion of the instrument. One Likert-type question was eliminated from the study due to error in development. The remaining 34 Likert-type questions yielded a coefficient alpha of .7780. Fourteen of the 34 Likert-type questions were combined into five measurement scales.

Cronbach's Coefficient Alpha for the five measurement scales ranged from .6899 to .8126. The five individual measurement scales are provided in Table 1. Nunnally (1967) suggested that in the early stages of research a modest reliability of .60 or .50 will suffice. Thus, no additional questions were eliminated from the study.

Table 1. Likert Scale Categories and Descriptive Statistics, Student Interest in Taking a Course via the Internet, Texas A&M University, Fall 1999 and Spring 2000 (n=166).

Categories	Mean	SD	Alpha	# of Questions
Frequency of E-mail and Internet Use	4.45	.723	.6899	2
Importance of Instructor Interaction	2.28	.873	.7791	2
Importance of Classmate Interaction	3.47	.844	.7287	3
Interest in Taking Courses Via the Internet	3.77	.909	.8126	3
Self-perceptions of Time Management	3.07	.783	.7775	4

Note: 1 = Strongly Disagree, 2 = Disagree, 3 = Unsure/No Opinion, 4 = Agree, and 5 = Strongly Agree

Data Collection and Analysis

The instrument was placed on the Internet and students entered their responses directly into the online survey. The Statistical Package for the Social Sciences (SPSS) computer program was used to analyze the data. Descriptive statistics consisting of means, standard deviations, and percentages were used to describe the sample. Cronbach's Coefficient Alpha was used to determine the reliability of the instrument as well as the five measurement scales. Pearson's Product Moment Correlations were computed to examine relationships among variables and one-way ANOVAs were used to examine differences between means.

Results

Sample Profile

The profile of the sample is based on questions related to personal characteristics and computer experience. A total of 166 students (almost 70% of the population) completed the survey. The sample of students consisted of 54% females and 46% males. Eleven of the students were married. Eighty-eight percent of the respondents were Anglo, 10% Hispanic, 1% African-American and 1% Asian/Indian. Seventy-five percent of the students in the sample were enrolled in the College of Agriculture and Life Sciences. Representation from other colleges was as follows: College of Liberal Arts, 8.4%; College of Engineering, 7.2%; College of Education, 3.0%; College of Architecture, 2.4%; College of Business, 1.8%; College of Veterinary Science, 1.2%; College of Science, 0.6%; and College of Medicine, 0.6%.

Almost 57% of the respondents were enrolled in fourteen or more hours of coursework during the semester. An additional 41% carried a load of 9-13 hours while the remaining students were enrolled for eight or less credit hours. (A student must be enrolled a minimum of twelve credit hours to be considered a full-time student at Texas A&M University.) More than half of the students were employed in some capacity. Twenty-two percent of the respondents worked 10-19 hours per week in addition to attending classes. Another 19% worked 20-29 hours/week while slightly more than 7% worked 30 or more hours/week.

As revealed in Table 2, the population can be described as computer users because 92.8% indicated convenient access to a personal computer and 86.7% indicated access to the Internet at home. Only 2.4% of the students described their computer use as "limited." All the students reported that they were comfortable using Microsoft Word, but only 30% were comfortable with Corel WordPerfect. In addition, 76.5% of the students indicated that they were comfortable using Microsoft PowerPoint.

Objective One: Student Interest in Taking a Course Via the Internet

Students expressed interest in taking courses using distance education delivery methods as indicated in Table 3. While a high percent (67.5%) of the students had not taken a course via distance education, 60.8% indicated that they would have been interested in taking AGED 340 via the Internet. More than 80% of the students indicated that they would be interested in taking one or more college courses through the Internet, rather than in a traditional face-to-face classroom. In contrast, the three Likert-type questions designed to measure student interest in taking courses via the Internet yielded a mean of 3.77 (SD = .909) indicating only slight interest in online course delivery.

Students who were interested in taking AGED 340 via the Internet (Mean=2.52, SD=.876) rated instructor interaction significantly higher at the .01 level (F =21.08) than students who preferred to take the course in a traditional face-to-face classroom (Mean=1.91, SD=.737). In contrast, students who preferred taking AGED 340 in a traditional face-to-face classroom rated classmate interaction more important than students wishing to take it via the Internet.

Objective Two: Student Characteristics Influencing Interest in Taking Courses Via the Internet

Student characteristics were examined to determine their influence on student interest in online courses. Analysis of the Pearson product moment correlations between students' gender, ethnicity, college, number of hours enrolled, and the number of hours employed per week and the students' interest in taking AGED 340 or other college courses via the Internet revealed no significant relationships.

Table 2. Computer Experience Reported by Undergraduate Students, Texas A&M University, Fall 1999 and Spring 2000 (n=166).

Question	Response	n	%
Do you have convenient access to a personal computer?	YES	154	92.8
	NO	11	6.6
Do you have access to the Internet at home?	YES	144	86.7
	NO	22	13.3
If you have access to the Internet at home, how are you connected?	Modem (baud rate: 9600)	2	1.2
	Modem (baud rate: 14.4)	3	1.8
	Modem (baud rate: 28.8)	21	12.7
	Modem (baud rate: 56K)	55	33.1
	Cable modem	8	4.8
	ISDN	0	0
	Ethernet	14	8.4
	I do not know.	44	26.5
How would you describe your level of computer use?	Limited	4	2.4
	Moderate	100	60.2
	Extensive	62	37.3
Which of the following computer programs do you feel comfortable using?	Microsoft Word	166	100
	Corel WordPerfect	50	30.1
	Microsoft PowerPoint	127	76.5
	Microsoft Excel	131	78.9
	Microsoft Access	58	34.9

Table 3. Student Interest in Non-traditional, Distance Education Course Delivery, Texas A&M University, Fall 1999 and Spring 2000 (n=166).

Question	Response	n	%
Have you taken a course using a distance education delivery method (TTVN, Video Conference, Internet, Written Correspondence) in which you did not meet in a traditional face-to-face classroom?	YES:	54	32.5
	NO:	112	67.5
If the opportunity had been available, would you have been interested in taking AGED 340 through the Internet?	YES:	101	60.8
	NO:	65	39.2
If given the opportunity, how many of your college courses in a semester would you be interested in taking through the Internet, rather than meeting in a traditional face-to-face classroom?	0 Courses:	33	19.9
	1 Course:	49	29.5
	2 Courses:	63	38.0
	3 Courses:	9	5.4
	4 Courses:	12	7.2

Evaluating the responses to four Likert-type questions regarding the students' self-perceptions of time management revealed they were unsure of these skills (Mean = 3.07, SD = .783). Almost 69% of the respondents indicated that they learned best in either a quiet place (26.5%) or at a personal workspace at home (42.4%). As can be seen in Table 1, students indicated frequent use of e-mail and the Internet (Mean=4.45, SD=.723); however, they were less familiar with online discussion tools such as chat rooms (Mean=3.69, SD=1.22) and discussion boards (Mean=2.94, SD=1.21). It is possible that these factors could influence interest in participating in online courses.

Objective Three: Instructional Design Considerations Based on Student Preference

Instructional design considerations were evaluated based on student perceptions of importance. Students were asked, "On average, how many minutes per session would you be willing to spend on a three-credit hour course provided through the Internet (not including the completion of assignments)?" As seen in Figure 1, 129 (77.8%) of the students indicated they would spend 16-45 minutes per session (30 minute average). When asked, "On average, how many hours per week would you be willing to spend on a three-hour course provided through the Internet (not including the completion of assignments)," 38.2% of the students indicated they were willing to spend 2.5 hours (normal class time)/week on an Internet course. The remaining responses were split as follows: 45.5%, less than 2.5 hours and 16.3%, greater than 2.5 hours.

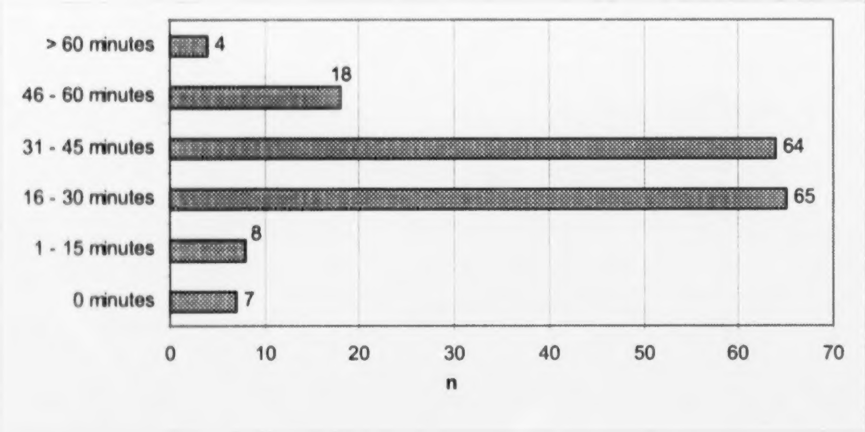

Figure 1. Minutes per session students are willing to spend on a three-credit hour course provided through the Internet (not including the completion of assignments), Texas A&M University, Fall 1999 and Spring 2000 (n=166).

In response to the question, "If a course were designed to help you learn best, how would the information be presented," on average, students ranked the delivery options in the following order of preference: 1) audio, 2) graphics, 3) video, 4) text, and 5) self-evaluated test questions (see Table 4). This finding, when associated with the Likert-type question focused on the "importance of graphics for understanding," lends further support to the preference of using graphics in instruction with a mean of 3.96 (SD = .8182). While text was ranked fourth in the students' order of preference, it is important to note that the ability to print online text was indicated as being very important to the students (Mean = 4.27, SD = .703).

Table 4. Ranking of Preference as to How Information is Presented, Undergraduate Students, Texas A&M University, Fall 1999 and Spring 2000.

	n					*Avg. Ranking
	1st	2nd	3rd	4th	5th	
Audio (comments, explanations, etc.) (n=164)	42	46	41	24	11	2.49
Graphics (pictures, diagrams, etc.) (n=163)	41	36	44	27	15	2.63
Video (n=163)	44	36	35	31	17	2.64
Text (Chapters, Articles, etc.) (n=163)	26	31	23	31	52	3.32
Self-Evaluated Test Questions (n=163)	15	18	21	45	64	3.77

*1 indicating highest preference

As revealed in Table 5, approximately 62% of students ranked "traditional classroom course" as their preferred delivery method for college courses. Approximately 26% of students ranked "Stand-alone Internet course" as their preferred delivery method. The other delivery methods, "Written Correspondence Course," "Course delivered via Video Conference" and "Facilitated Internet Course," were preferred by only 12% of the students.

Table 5. Ranking of Course Delivery Preference of Undergraduate Students, Texas A&M University, Fall 1999 and Spring 2000.

	n					*Avg. Ranking
	1st	2nd	3rd	4th	5th	
Traditional Classroom Course (n=164)	102	23	17	13	9	1.80
Stand-alone Internet Course (n=165)	44	39	25	36	21	2.70
Facilitated Internet Course (n=164)	6	44	46	36	32	3.27
Video Conference Course (n=164)	8	34	43	40	39	3.41
Written Correspondence Course (n=164)	2	33	35	34	60	3.71

*1 indicating highest preference

Students were asked, "While participating in an online course, which option would you prefer? 100% of the course be taught online; Course material be taught online, with a monthly class meeting; Course material be taught online with a lab that meets once/week; I would not want to participate in an online course." As revealed in Figure 2, only 12.7% selected not to participate when given the option of selecting an Internet-based course with either a weekly or monthly meeting. In fact, the majority (76.3%) of the students opted to participate in an online course that included a regularly scheduled meeting.

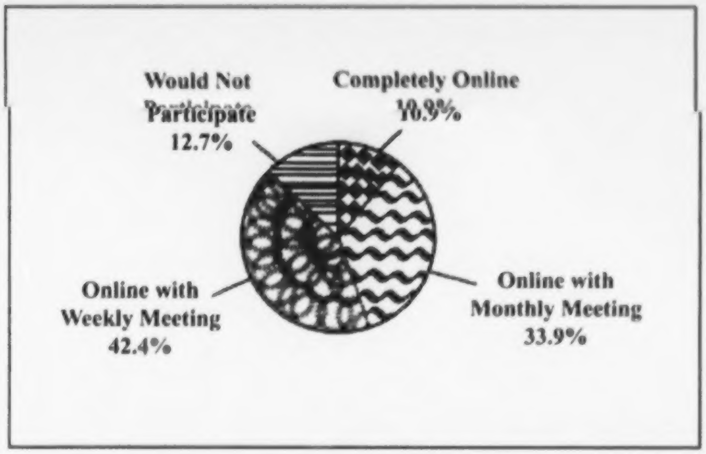

Figure 2. Preferred Option when Participating in an Online Course, Undergraduate Students, Texas A&M University, Fall 1999 and Spring 2000 (n=166).

When asked, "How many questions do you ask to the instructor during a typical 50-minute classroom lecture of a course similar to AGED 340," almost half of the students responded that they do not ask any questions. As revealed in Figure 3, only 18% of the students reported asking two or more questions. Evaluation of the responses to the Likert-type questions related to "importance of instructor interaction" and "importance of classmate interaction," reveal that students do believe classmate interaction to be important but do not believe instructor interaction to be important (see Table 1 for means and standard deviations).

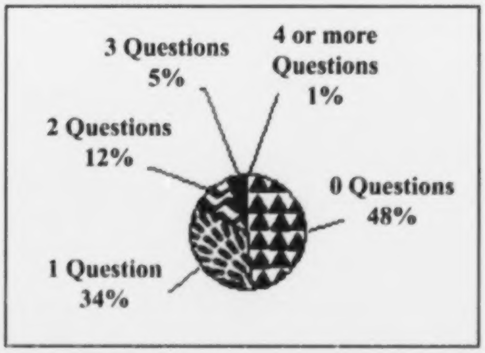

Figure 3. Number of Questions Asked in A Typical Lecture by Undergraduate Students, Texas A&M University, Fall 1999 and Spring 2000 (n=166).

Conclusions

Overall, students indicated an interest in participating in courses delivered via the Internet. While 60.8% of the students responded that they would have been interested in taking AGED 340 via the Internet, it is interesting to note that when the students were asked to select an option of methods to receive an Internet-based course (including the option not to participate), over 87% selected an option to participate. In fact, 76.3% preferred that the course material be taught online with a regularly scheduled meeting with the instructor and other students. In contrast, students expressed less interest according to the Likert-type scale, "Interest in Taking Courses Via the Internet" (mean = 3.77). This discrepancy might be explained by the wording of the questions in that scale. Two of the three questions used in the scale include reasons (i.e. flexibility, independence) for interest in Internet-based courses. It is possible that students perceive other reasons for taking courses via the Internet. Given the current structure of the course (two one-hour lectures and a one-hour small group laboratory per week), it is believed that students have interest in online instruction that includes a traditional lab. This leads one to conclude that students are more comfortable with an online course when there is a scheduled meeting that accompanies it.

It was postulated that the greater the number of hours per week that a student was employed, the greater would be their interest in taking courses through the Internet. More than half of the students were employed in some capacity; however, no significant relationships were discovered between interest in online courses and the number of hours worked. In fact, no significant relationships were discovered between any of the students' personal characteristics examined and their interest in taking Internet-based courses. Thus, one could conclude that interest in Internet-based courses could be based on factors other than the personal characteristics examined.

Based on student responses regarding time commitment to an Internet-based course, it can be concluded that students preferred modules to be limited to an average of 30 minutes/session and they expected to spend the same amount of time online per week as in a traditional classroom. Students interested in taking courses via the Internet did not feel that classmate interaction was as important as did students who preferred traditional classroom instruction. Less than 2% of the students indicated that no discussion occurred during a typical classroom lecture, however, almost half of the students indicated that they do not ask questions of the instructor during class. Given the highly interactive nature of the laboratory sessions, this is understandable. These findings support "discussion" as an important facet of instructional design. According to student responses, it can be concluded that students believe the use of audio and graphics in online course delivery to be important in helping them learn.

Students who preferred taking AGED 340 in a traditional face-to-face classroom rated classmate interaction higher than students preferring to take it via the Internet. Thus, it can be concluded that preference for classmate interaction may impact student interest in Internet-based courses. Because 62% of the students ranked traditional classroom delivery as their first choice, one can conclude that this was their preferred delivery option. However, when traditional classroom delivery is not a viable delivery option, stand-alone Internet courses with periodic meetings would be their next preference.

Implications and Recommendations

The implications for developing quality online educational courses create challenges and opportunities to those who seek to offer quality learning experiences. This study sought to determine whether there would be interest in delivering AGED 340 via the Internet, if there were student characteristics that would influence interest, and further sought to determine particular features and characteristics that should be incorporated into the course to make it as effective as possible. The educational importance of the study relates to the need for the course to be delivered to larger numbers of students with the same number of faculty and teaching assistants. Further, the importance lies in the desire to develop learner-centered instruction.

This study did not reveal any personal characteristics that proved to impact interest in receiving a course via the Internet. It is recommended that further research be conducted to determine if characteristics not examined in this study (i.e., learning styles, etc.) influence interest in specific online courses. Understanding factors that influence interest can assist instructional designers in addressing issues related to specific groups.

Given the fact that students are interested in receiving AGED 340 and other courses via the Internet, it is recommended that AGED 340 and other courses be considered for online delivery. Scheduled meetings, either weekly or monthly, are perceived by students to be an important part of the course. Based on the current structure of the course, it is believed that students enjoy the lab component. Thus, it is up to the course designer to develop new and innovative methods to allow this characteristic to continue. The students indicated that audio and graphics helped them to learn better. We must continue to strive to take complicated parts of a body of knowledge and break them down by using graphics and audio to provide learning opportunities. In addition, the value of simulations and animations in instructional design should be examined for their effect on learning and used appropriately. It is important to remember that as noted in an article by Madjidi, Hughes, Johnson, and Cary (1999), one needs to not replicate the traditional classroom, but create a more learner-centered approach. This study provides baseline information that can assist in the development of an online leadership course to meet current needs.

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Interest in Online Leadership Education and Implications for Instructional Design Strategies

A Critique

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Contributions and Significance of Research

The results of this study add to the limited body of knowledge surrounding using the Internet to deliver leadership courses. Offering courses via the Internet is becoming a giant tool waiting to be tapped by students and educators throughout the world. What is mentioned in this paper is how valuable the Internet is in delivering courses. This descriptive study was used to identify student interest and demand for Internet, **not** distance delivered, courses in leadership.

Procedural Considerations

The study was well designed and conducted in meeting the researcher objectives. It was evident from examining the related literature that an adequate and defensible theoretical base had been developed. The statistical methods identified in the study were appropriate for this descriptive study.

Questions for Consideration

Are students taking the leadership course because it is Internet delivered and that their course schedule would not allow the course to be taken in any other mode or method? These students were all on campus, so what is the advantage of the Internet course? How often were they required to go to the Internet as an active participant in the course? What I really want to know is does placing course materials on the Internet make a difference in what the students learns and how much they retain? Perceived benefits are one thing but actual results will tell us more and either support or not support what is being said or hypothesized. Bottom line question is why offer this course online to on campus students?

In the three studies from Texas I have some questions that need to be answered concerning your infrastructure. As you are delivering the courses via distance delivery techniques has your university structure changed to accommodate the needs of distance delivery? Such things as personal communication tools and applications, network of networks for web based courses or web based campus, dedicated servers and software applications for distance delivery, and software applications and services for those away from your campus structure. Just how has the physical campus infrastructure changed to accommodate the use of distance delivery of courses?

Predictors of Student Retention in Colleges of Agriculture

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Abstract

The primary purpose of this study was to identify those factors that most accurately predict a student's intention to complete a degree in a college of agriculture. Specific research objectives were to identify similarities and differences of college of agriculture freshmen from predominately urban backgrounds, as compared to those in an institution with students predominately from rural backgrounds; determine the relationship between a student's intention to change colleges and majors and selected demographic variables; and determine if a combination of perceived effect components could explain the variance in students' retention plans. Freshmen in the two Midwestern institutions who comprised the study differed in background and levels of agricultural experience. Students who had experience in agriculture, completed high school agriculture courses, were members of the FFA and/or 4-H, and lived in a rural setting were more likely to complete a degree in a college of agriculture than were freshmen who have not had those experiences. By contrast, students with higher class ranks were more likely to drop out of the colleges of agriculture than were students with agricultural experience or students who had completed high school agriculture coursework. The best predictors of student retention in the colleges involved in this study were the students' prior experience in agriculture and their enrollment in high school agriculture programs.

Introduction and Theoretical Framework

One of the major problems plaguing college administrators nationwide is the recruitment and retention of quality students who are likely to enter the agricultural industry upon graduation. Precluding this problem were the dramatic decreases in enrollment in colleges of agriculture in reaction to the farm crisis of the early 1980s. During this period of time, enrollments in agriculture programs at both the high school and university levels underwent major changes (Dyer & Osborne, 1994). In no areas were the repercussions greater than in those states whose economies were most closely tied to the agricultural sector. Hardest hit were states in the Midwest whose agricultural economies depended upon the successful production and marketing of grain crops which were tied to government subsidies. Likewise in the Midwest, some of the most drastic decreases in high school agriculture program enrollments were reported. In Illinois, enrollments decreased by over 60% (Illinois State Board of Education, 1993), while Iowa experienced a decrease of nearly 53% from 1976 to 1990 (Iowa Department of Education, 1997). Over the same time period, enrollment in Illinois and Iowa public schools decreased by 25% and 20%, respectively, indicating that other factors were contributing to the attrition in agriculture program enrollments (United States Department of Education [USDE], 1996).

As the effects of the decreases in high school enrollments rippled to the university level, Manderscheid (1988) reported a 24% decline in Land Grant University agriculture enrollments and a 13% decrease in non-Land Grant University agriculture enrollments from 1978 to 1988. Paralleling this decrease in university agriculture program enrollments were cutbacks in faculty positions. According to the American Association for Agricultural Education (AAAE), university agricultural education faculty membership decreased from a 1984 high of 326 members to a 1999 low of 226 members, a decrease of 31% (AAAE, 1999).

Interestingly, as universities were responding to decreased student numbers by downsizing agricultural education departments and programs, high school enrollments in agriculture courses were rebounding. Several states modernized agriculture curricula as suggested by the National Research Council (1988) and reaped almost immediate results in the form of increased student numbers. At an enrollment of nearly 3/4 million students in 1993-94 (USDE, 1996), high school agricultural education program enrollments have recovered to the record pre-recession enrollments. Given the national decrease of over 20% in the number of school age children (USDE), the case could easily be made that agricultural education at the high school level is actually healthier than at the pre-recession era.

At the university level, colleges of agriculture are also reporting increased enrollments. Litzenberg, Whatley, and Scamardo (1992) reported that with the exception of the North Central Region, agricultural enrollments had recovered to early 1980 levels. According to USDE enrollment figures, 1992 enrollments in colleges of agriculture nationwide have increased by 18.9% over the 1981 enrollment of 802,000 students (USDE, 1996). However, the demographic composition of today's college of agriculture students has changed in many instances from that of the 1980s. Dyer, Lacey, and Osborne (1996) reported that 66.4% of freshmen in the College of Agriculture at the University of Illinois at Urbana-Champaign (UIUC) were from urban areas. Even in Iowa, a state with a low population density, Scofield (1995) noted an increase in urban backgrounds of College of Agriculture freshmen at Iowa State University (ISU) in 1994.

According to Russell (1993), this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. Russell warned of an impending "brain drain" in the agricultural industry if the loss of individuals trained and experienced in agriculture continues.

With an increasing number of freshmen coming from urban backgrounds, and/or situations in which they have no pre-college training in agriculture, new problems have emerged. Dyer et al. (1996) reported a loss of nearly 11 million dollars of instructional money due to the failure to retain students beyond their freshmen year. This loss was largely due to students with higher academic credentials, but no agricultural experience, being admitted to a college of agriculture, then dropping out before graduation.

The overall problem continues to be how to accurately identify and retain students who are likely to complete a program of instruction and seek employment in the industry of agriculture. This research seeks to address this problem.

The conceptual model for this research emphasized the need to study those factors that influence a student's selection and pursuit of a field of study and corresponding career choice. Fishbein and Ajzen (1975) provided the theoretical framework for this study. They determined that intentions to participate in an activity could be predicted based upon knowledge, observation, or other information about some issue. This suggests that a person's intent to pursue study in a field of agriculture, or to become actively involved in an agricultural career, may be predicted by analyzing his/her beliefs about agriculture. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate them positively.

Purpose

The primary purpose of this study was to identify those factors that most accurately predict a student's intention to complete a degree in a college of agriculture. Specific research objectives were to:

1. Identify similarities and differences of college of agriculture freshmen from predominately urban backgrounds, as compared to those in an institution with students predominately from rural backgrounds.
2. Determine the relationship between a student's intention to change colleges and majors and selected demographic variables (gender, grade point average, ACT score, geographical background, experience in agriculture, enrollment in high school agriculture, membership in FFA and 4-H, and class rank).
3. Determine if a combination of perceived effect components could explain the variance in students' retention plans.

Procedures

The study employed a descriptive-correlational research design. Data were compiled from college of agriculture freshmen at Land Grant universities in two Midwestern states – Illinois and Iowa – during the 1995-96 and 1996-97 school years ($\underline{N} = 1008$). These states were selected because of differences in admission procedures of freshmen (UIUC has a capped enrollment whereas ISU utilizes an open enrollment philosophy), because of the close relationship between agriculture and local and state economies, and because of the variance in geographic background of the students who comprise the population.

Student rosters from each college of agriculture's admissions office served as the population frame for the study. Students were surveyed in freshmen introductory courses and were mailed questionnaires as outlined by Dillman (1978). A total of 725 (71.9%) usable instruments were collected. Ten percent of the non-respondents in each phase of the study were randomly selected and completed questionnaires by telephone. No significant differences were found in data obtained from non-respondents and that obtained from initial participants. Therefore, data were generalized to the entire population.

Data-gathering instruments were developed by the researchers. Content and face validity were determined by a panel of experts from college of agriculture faculty. Part I of the instrument contained demographic information, close-ended, and partially close-ended items. Part II identified attitudes of students toward the field of agriculture. A five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree) was used for the 21 items comprising Part II of the questionnaire. The instrument was pilot tested using 12 freshmen students not enrolled in a college of agriculture and 11 sophomore and junior college of agriculture students (n = 23). Part II of the instrument was divided into three constructs: Attitudes Toward Agriculture as an Area of Study, Attitudes Toward High School Agriculture Programs, and Attitudes Toward University Agriculture Programs. Reliability estimates were determined for the three constructs using Cronbach's Alpha (r = .85, .78, .88, respectively). Data were analyzed using SPSS for Windows. Descriptive statistics, including measures of central tendency and variability, were used to simplify and characterize data. Regression analysis was used to explain variance in factors influencing students' intentions. Independent variables included class rank, ACT score, grade point average, gender, geographic background, experience in agriculture, membership in 4-H and FFA, and enrollment in high school agriculture programs. The dependent variable was student intention to change college. An alpha level of .05 was set a priori.

Results

Objective 1: *Identify similarities and differences of freshmen in a college of agriculture with students predominately from urban backgrounds, as compared to those in an institution with students predominately from rural backgrounds.*

The populations of students in the two colleges differed in gender, ethnicity, and agricultural background/experience. As noted in Table 1, most students in the urban setting (UIUC) were female and Caucasian. Whereas most students in the rural setting (ISU) were also Caucasian, the sample differed in that a majority of the rural students were male, with an almost non-existent presence of African-American, Hispanic, or Asian ethnicity/ancestry.

Less than one in five students in the Illinois study indicated that they had completed high school agriculture courses. By contrast, 54% of respondents in Iowa reported having completed at least one high school agriculture course. Of the Illinois students who had completed courses in high school agriculture programs, over three-fourths rated the program "Good." Only 6.9% rated the programs as "Poor." In Iowa, 62.1% of the respondents who had completed high school agriculture classes rated the programs as "Good" while only 7.5% rated the quality "Poor." The major reason listed in both states for not enrolling in high school agriculture courses was that no program was offered.

Less than 14% of the students in Illinois indicated they had been FFA members in high school compared to almost half (47%) of the respondents in Iowa. Approximately one-fourth of the Illinois respondents reported membership in 4-H as compared to over half of the Iowa respondents.

Table 1
Demographic Characteristics of Freshmen Enrolled in Colleges of Agriculture

	ISU	UIUC
Gender		
Female	43.0 (167)	55.6 (179)
Male	57.0 (222)	44.4 (143)
Ethnicity		
Caucasian	97.2 (369)	90.7 (283)
Asian	1.0 (4)	5.4 (17)
African-American	1.3 (5)	1.9 (6)
Hispanic	0.5 (2)	1.3 (4)
Other	1.8 (7)	0.6 (2)
High School Agriculture Completed	54 .0(214)	18.4 (59)
FFA Member	47.0 (182)	13.8 (44)
4-H Member	55.2 (214)	27.3 (86)
Geography		
Urban (over 10,000)	23.7 (94)	66.4 (215)
Small towns (<10,000) & Rural areas	28.8 (114)	11.4 (37)
Farm	47.5 (188)	22.2 (72)
Experience in Agriculture		
Paid	5.6 (22)	25.8 (66)
Unpaid	11.6 (46)	18.0 (46)
Both Paid and Unpaid	66.4 (263)	25.0 (64)
None	16.4 (65)	31.2 (80)
Attitudes Toward Programs of Study		
Plan to Change Colleges	5.9 (22)	39.4 (195)
Plan to Change Majors	17.3 (61)	48.2 (66)

In a review of literature, Scofield (1995) reported a largely rural student population at ISU, whereas Dyer et al. (1996) reported a majority of Illinois students to be from urban or suburban backgrounds. This study confirmed those earlier findings. In Illinois, two-thirds (66.4%) of the respondents reported they were from large or medium urban areas whereas three-fourths of the Iowa respondents reported farm, rural, or small town backgrounds.

Iowa freshmen also indicated that they had considerably more experience in agriculture prior to admission to the College of Agriculture. Roughly two-thirds (66.4%) of Iowa students indicated they had both paid and unpaid experiences in agriculture, whereas only 16.4% indicated they had no agricultural experience prior to enrolling. By comparison, 25.8% of the students in

Illinois reported paid work experience in agriculture, whereas 31.3% reported no prior experience of any kind with agriculture.

Students' attitudes toward their major area of study differed markedly between the two institutions involved in the study. In the Illinois school, 39.4% of the freshmen indicated they planned to leave the College of Agriculture. An additional 48.2% indicated they were contemplating a change of majors before graduating. By comparison, only 5.9% of the respondents at ISU indicated they were planning a change of college. Only 17.3% were contemplating changing majors.

The one area of similarity was in the question asking students to list what they most liked about their respective College of Agriculture. Students in both institutions listed the "friendly atmosphere" in the college and the "faculty" as their first and second choices, respectively.

Objective 2: *Determine the relationship between a student's intention to change colleges and majors and selected demographic variables (gender, grade point average, ACT score, geographical background, experience in agriculture, enrollment in high school agriculture, membership in FFA and 4-H, and class rank).*

Tables 2 and 3 present the correlation matrix for variables under consideration (experience in agriculture, gender, geographic background, grade point average, ACT score, membership in FFA, membership in 4-H, class rank, intent to change colleges). Ethnicity/race was dropped from consideration due to lack of variance (IL = 90.7% Caucasian, 1.9% African-American, 5.4% Asian, 1.3% Hispanic; IA = 97.2% Caucasian, 1.3% African-American, 1.0% Hispanic, and .5% Asian).

Table 2
Intercorrelations of Demographic Variables of UIUC College of Agriculture Freshmen

	Intercorrelations									
Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
Class Rank (X_1)	1.00	-.167	-.576	.086	-.548	-.471	-.416	-.344	-.293	.375
ACT (X_2)		1.00	.183	.035	.020	-.013	-.061	-.057	-.011	-.082
GPA X_3			1.00	.003	.292	.144	.204	.124	.041	-.162
Gender[a] (X_4)				1.00	-.225	-.233	-.124	-.284	-.256	.027
Geography[b] (X_5)					1.00	.523	.541	.420	.318	-.266
Agricultural Experience[c] (X_6)						1.00	.511	.468	.398	-.355
4-H member[d] (X_7)							1.00	.442	.371	-.301
FFA member[d] (X_8)								1.00	.857	-.294
High school Agriculture[d] (X_9)									1.00	-.318
Change College[e] (Y)										1.00

[a] 1 = male, 2 = female

[b] 1 = Large metropolitan (>100,000); 2 = Urban (50,000 – 99,999); 3 = Medium urban (10,000 – 49,999); 4 = Small town (<10,000); 5 = Rural, but not farm; 6 = Farm

[c] 1 = none, 2 = paid experience, 3 = unpaid experience, 4 = both paid and unpaid experience

[d] 1 = no, 2 = yes

[e] 1 = no, 2 = maybe, 3=yes

In the Illinois phase of the study (Table 2), moderate associations (Davis, 1971) were identified between the criterion variable (student intention to change college) and the variables class rank (r = .375), experience in agriculture (r = -.355), membership in 4-H (r = -.301), and enrollment in high school agriculture classes (r = -.318). Low correlations were found between the criterion variable and GPA (r = -.162), geographical background of students (r = -.266), and membership in FFA (r = -.294).

In the College of Agriculture at UIUC, students with higher class ranks (i.e., 1st in their high school class) were more likely to drop out of the College than were students ranked lower in their classes or who had a lower grade point average. However, students with experience in agriculture, who were enrolled in high school agriculture classes, who were 4-H or FFA members, or who were from less populated areas were more likely to complete their degrees within the College.

Weaker relationships were identified in the Iowa portion of the study, however, the same trends prevailed. Class rank had only a negligible relationship to students' intention to change college (r = .041). Low associations were found between the criterion variable and geography (r = .170), experience in agriculture (r = -.251), membership in 4-H (r = -.146), membership in FFA (r = -.173), and enrollment in high school agriculture (r =-.140).

Table 3
Intercorrelations of Demographic Variables of ISU College of Agriculture Freshmen

	Intercorrelations									
Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	Y
Class Rank (X_1)	1.00	-.355	-.648	.071	.186	-.093	-.121	-.090	-.061	.041
ACT (X_2)		1.00	.473	.147	.221	-.179	-.026	-.136	-.184	.078
GPA (X_3)			1.00	.247	.089	-.089	.009	-.024	-.052	.016
Gender[a] (X_4)				1.00	.209	-.292	-.003	-.077	-.077	.119
Geography[b] (X_5)					1.00	.581	.476	.423	.434	.170
Agricultural Experience[c] (X_6)						1.00	.370	.423	.438	-.251
4-H member[d] (X_7)							1.00	.354	.298	-.146
FFA member[d] (X_8)								1.00	.814	-.173
High school Agriculture[d] (X_9)									1.00	-.140
Change College[e] (Y)										1.00

[a] 1 = male, 2 = female

[b] 1 = Large metropolitan (>100,000); 2 = Urban (50,000 – 99,999); 3 = Medium urban (10,000 – 49,999); 4 = Small town (<10,000); 5 = Rural, but not farm; 6 = Farm

[c] 1 = none, 2 = paid experience, 3 = unpaid experience, 4 = both paid and unpaid experience

[d] 1 = no, 2 = yes

[e] 1 = no, 2 = maybe, 3=yes

Objective 3: *Determine if a combination of perceived effect components could explain the variance in students' retention plans.*

Stepwise multiple regression was used to determine which, if any, of the variables were significant predictors of students' intentions to remain enrolled in their respective college of agriculture. Table 4 indicates that students' prior experience in agriculture and enrollment in high school agriculture programs were significant predictors of their intention to continue their education in the UIUC College of Agriculture, explaining 17% of the variance. Likewise, Table 5 indicates that students' prior experience in agriculture was the only significant predictor of their intention to matriculate in ISU's College of Agriculture, but explained only 7% of the variance.

Table 4
Multiple Regression of Student Intent on Variables of Interest[a] of UIUC Freshmen.

Predictor	B	SE B	*B*	t
Experience in Agriculture	-7.300	.035	-2.060	-2.060*
High School Agriculture	-.674	.300	-2.249	-2.249*

Note. $R^2 = .17$. *$p<.05$.
[a] = experience in agriculture, high school agriculture, geographic background, membership in FFA, membership in 4-H, class rank, ACT score.

Table 5
Multiple Regression of Student Intent on Variables of Interest[a] of ISU Freshmen.

Predictor	B	SE B	*B*	t
Experience in Agriculture	-3.700	.018	-.136	-2.010*

Note. $R^2 = .07$. *$p<.05$.
[a] = experience in agriculture, high school agriculture, geographic background, membership in FFA, membership in 4-H, class rank, ACT score.

Conclusions and Recommendations

Care should always be taken in generalizing findings to populations other than that which was studied. With this limitation in mind, and based upon the findings of this study, the following conclusions were drawn and recommendations made:

Freshmen in the two institutions comprising the study differed in background and levels of agricultural experience. University of Illinois students were generally more urban or suburban in their background, lacked agricultural experience, had little or no high school agriculture classroom experience, and were more ethnically diverse than were the Iowa respondents. By contrast, Iowa State University students generally had farm, rural, or small town backgrounds and considerable agricultural experience, including enrollment in high school agriculture programs.

Students who have experience in agriculture, completed high school agriculture courses, were members of the FFA and/or 4-H, and lived in a rural setting are more likely to complete a degree in a college of agriculture than are freshmen who have not had those experiences. By contrast, students with higher class ranks are more likely to drop out of the colleges of agriculture than are students with agricultural experience or students who have completed high school agriculture coursework.

The best predictors of student retention in the colleges involved in this study were the students' prior experience in agriculture and their enrollment in high school agriculture programs. Colleges should recruit students who have agricultural experience, whether that experience is gained through background or high school agriculture course work.

This study should be replicated on a national level with an emphasis on explaining a greater percentage of variance in students' reasons for changing colleges and/or majors. In addition, a follow-up study should be conducted to determine if students followed through with plans to either continue in their degree programs or to transfer from, or drop out of, their major or college.

Implications

Many colleges of agriculture identify and recruit students based solely upon ACT score, grade point average, and class rank. These institutions are likely using the wrong criteria for selection – if student retention is a goal. When identifying and recruiting students for admission to colleges of agriculture, more emphasis should be placed on students' agricultural experience and/or transcript evidence of enrollment in high school agricultural education courses. Likewise, if the mission of a college of agriculture is to produce graduates for entry into the agricultural industry, valuable resources are wasted if those graduates do not complete their program of study.

Bekkum (1993) noted that the agricultural industry places considerable importance on the background and experience of graduates. However, students are not entering some colleges of agriculture with the agricultural experience desired by prospective employers. If colleges of agriculture are to be a reliable source of students, those colleges must either be more selective in their recruitment of students or design a curriculum to provide agricultural experience at the university level. Where the mission was once the education of students in agriculture, the emerging trend may be to educate students about agriculture.

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Predictors of Student Retention in Colleges of Agriculture

A Critique

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The abstract of the paper was written clearly and included a concise overview of the purpose, objectives, and major findings of the study. The introduction oriented the reader to the need for and the rationale of the study. It included a discussion of the impact that changing demographics have on secondary school enrollments, enrollments in high school agriculture programs, and enrollments in colleges of agriculture nationwide. The reader was provided insight to and an overview of the human and economic loss experienced by society when students with higher academic credentials, but little or no agricultural experience were being admitted to colleges of agriculture, then dropped out or changed majors or colleges prior to graduation.

The problem statement, although not stated in question form, was explicit and specified in the intent of the study. The study was based on a relevant theoretical and conceptual framework. By grounding the study within the context of career choice literature, the structure of the paper had focus. Given the framework, appropriate judgments about the outcomes compared to theoretical results could be made.

The purpose and objectives of the study were presented clearly. The methods used to collect data for the study were generally described in detail; however, it would have been useful to know the time of year that data were collected. To ask first year students about plans for changing majors or transferring from one college to another prior to getting established in their higher education experience may be a weakness in this study. However, the results presented were aligned with the objectives thus making the tables and presentation of results easy to follow. The tables and presentation of results were meaningful and well written.

The authors appropriately cautioned the reader to be careful in generalizing the findings to populations other than those that were studied. Relevant conclusions and recommendations were made regarding the outcomes of the study, however, in the conclusions and recommendations section, results were not discussed within the context of the theoretical and conceptual framework described earlier. Including a discussion of how findings in the study supported or failed to support the theoretical rationale identified earlier in the paper could strengthen the paper. Also, the last sentence in the paper seems to go beyond the scope of the study and needs further explanation.

In summary, the study contributes to the growing body of knowledge compiled about the retention of students in colleges of agriculture. It provided insight into what two institutions with somewhat different first year college of agriculture students have encountered in undertaking a difficult task of maintaining enrollment to meet the dynamic needs of agricultural business and industry.

Problems in Student Retention: A Delphi Study of Agriculture Teacher Perceptions

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Abstract

The objective of the study was to identify the major problems facing high school agriculture teachers in retaining students for secondary agricultural education programs, as identified by agriculture teachers. To accomplish this objective the Delphi technique of obtaining group consensus was employed. The study used a series of four mailed questionnaires. The first round of the study used a questionnaire with an open-ended question. In the second questionnaire, respondents were asked to rate the items identified in round one on a five-point Likert-type scale. In the third round panel members were asked to indicate whether they agreed or disagreed with the statements from round two, and to provide comments if they could not agree with the summary findings. The fourth and final round produced concensus on ten of the statements from round three. The major problems identified by the Delphi technique in the successful retention of students in high school agricultural education programs were: scheduling difficulties, lack of guidance counselor support, the image of agriculture, increased graduation requirements, scheduling barriers created by college entrance requirements, competition from other school activities, block scheduling, the image of the local agriculture program, and the quality of the local agriculture instructor.

Introduction

The surging economy and workforce demands in the agriculture sector in the late 20th and early 21st centuries have posed some interesting challenges for agricultural educators. At the forefront of these challenges are the recruitment and retention of high quality students who are likely to enter employment in agriculture.

Whereas some enrollments in agricultural education programs are reported to have surpassed those of the pre-recession era of the late 1970s (Iowa Department of Education, 1999; Missouri Department of Elementary and Secondary Education, 1999; North Carolina State University, 1997), and other regions of the country have experienced enrollment surges, agriculture programs on a national scale continue to face enrollment stagnation (National FFA Organization, 1998). The inability of programs to retain high quality students undermines the ability of educational institutions to supply the national economy with an adequately trained workforce in agriculture (Office of Academic Programs, 1994). According to Goecker, Whatley, and Gilmore (1999), the agricultural sector continues to report an increased demand for, and an annual shortage of, graduates from colleges of agriculture.

Research on the retention of students in agricultural education programs is limited. The existing conceptual research base focuses primarily on retention at the postsecondary level. Several researchers have identified predictors of retention, including high school core GPA and learning styles (Garton, Dyer, & King, 1999), and high school rank (Allen, 1997; Murtugh, Burns, & Schuster, 1999). Dyer and Breja (1999) indicated that experience in agriculture, either from on-farm experience or from enrollment in secondary agriculture programs, as the most effective predictors of student retention at the postsecondary level. However, both Vernon (1996) and Ting and Robinson (1998) noted that other variables are likely to influence student retention.

While these studies have established factors predicting student retention at the postsecondary level, a void exists in the research base in identifying specific barriers to student retention at the secondary level. Furthermore, successful identification of these problems could provide agricultural educators with improved insight into practical strategies for retaining quality students in agricultural education programs and ultimately in their successful entry into the agricultural workforce.

The retention of a diverse student population that includes high quality students continues to be one of the most important and complex problems facing secondary agricultural education programs today. Students who become disillusioned at this level and drop out of high school agriculture programs may never consider enrollment into colleges of agriculture.

The theoretical framework for this study dates to Lewin's use of T-groups and lies in the premise that those individuals most closely associated with a particular problem (via experience) are more likely to possess exceptional knowledge of that problem. The Rand Corporation used this framework as a basis for development of the Delphi technique as defined by Dalkey (1969). Adapted to this study, agriculture teachers who have been successful in recruiting and retaining students are more likely to be able to identify those problems that prevent students from enrolling or re-enrolling in agricultural education classes.

Purpose and Objective

The purpose of this study was to develop a consensus document that would identify those problems that serve as obstacles to the successful retention of students in secondary agricultural education programs. The objective of the study was to identify the major problems facing high school agriculture teachers in retaining students for secondary agricultural education programs, as identified by agriculture teachers.

Procedures

This national study used the Delphi technique to identify problems that secondary agriculture teachers face in retaining students in high school agriculture programs. Delp, Thesen, Motiwlla and Seshadri (1977) described the Delphi technique as a group process used to solicit, collate, and direct expert responses toward reaching consensus. Helmer (1966) described the Delphi technique as a method of securing and refining group opinions and substituting computed consensus for an agreed-upon majority opinion.

The population for this study consisted of all high school agriculture teachers. Stufflebeam, McCormick, Binkerhoff, and Nelson (1985) noted the Delphi technique is especially effective in obtaining consensus from a purposively selected group of experts. In selecting the expert judges, state staff and teacher educators from each state were asked to nominate teachers from secondary agricultural education programs that were considered outstanding in their ability to recruit and retain students. Teacher educators and state staff provided a total of 275 unduplicated nominees. From this list a stratified random sampling technique was used to select 24 teachers to participate in the study. The four regions of the American Association for Agricultural Education comprised the strata from which six teachers each were randomly selected. Dalkey (1969) stated that the reliability was greater than .80 when Delphi group size was larger than 13.

The study used a series of four mailed questionnaires. Moore (1987) noted that a series of mailed questionnaires was the typical methodology of the Delphi technique. The first round of the study used a questionnaire with the open-ended question: "What are the major obstacles confronting teachers in the retention of students in agricultural education programs?" An open-ended question was used to facilitate the generation of a wide array of response categories. Responses were categorized to produce items for a second round questionnaire. Questionnaires were validated using an expert panel of university teacher educators, state agricultural education staff members, and agriculture teachers not included in the study.

In the second questionnaire, respondents were asked to rate the items identified in round one on a five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree). From second-round responses the list of categories was further reduced to 20.

The third questionnaire sought to determine consensus. Panel members were asked to indicate whether they agreed or disagreed with each of the 20 statements, and to provide comments if they could not agree with the summary findings. Consensus was reached on eight of the 20 items in this round. A fourth round was initiated in an attempt to reach consensus on the remaining items.

The fourth and final questionnaire also asked the respondents to indicate whether they agreed or disagreed with the 20 statements as modified from round three. Consensus was reached on ten of the statements in this round.

Analysis of Data

Data were analyzed using descriptive statistics. Data collected using Likert-type scales were treated as interval data and reported as means and standard deviations. Nominal data were reported using frequencies and percentages.

Results

This study sought to identify the major problems facing high school agriculture teachers in the retention of students in high school agricultural education programs. To accomplish this objective the Delphi technique of obtaining group consensus was employed. The first round of the study used a questionnaire with the open-ended question "What are the major obstacles confronting teachers in the retention of students in agricultural education programs?" This type of question was used to facilitate the generation of a wide array of response categories. Thirty-two categories of problems were identified in the first round. This number was reduced to 28 items when categories with a single response were eliminated.

Table 1 contains a summary list of problems identified in round one. The response rate for the first round of the study was 70.8%.

Table 1
Delphi Study Round One: Categories of Retention Problems (n = 17)

Problem Category	n
Scheduling difficulties	15
Guidance counselor support	15
Image of agriculture	15
College entrance requirements	15
Competition from other programs in your school	14
Integrating low and high performance students	14
Graduation requirements- not enough time for agriculture courses	12
Students active in other programs, activities, etc.	12
Block scheduling	12
Image of the agriculture program	12
Administrative support	10
Teacher commitment to recruiting	9
Parental support	9
Teacher quality	8
Type of curriculum – too traditional	8
Early dismissal (seniors get part of day off)	7
Maintaining student interest	7
Competition from vocational-technical schools	7
Community support	7
School policies	6
Quality of agriculture course instruction	6
Quality of agriculture curriculum	6
Employment opportunities agriculture	6
Program quality	6
School dropouts (GED)	6
SAE participation	4
Focus of program on leadership	3
FFA activities	3

In round two respondents were asked to rate the 28 problems identified in round one on a five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree). Respondents were also asked to make changes in the items to better clarify the problems, if necessary. Seventeen of the 24 individuals comprising the Delphi panel responded in this round for a round two response rate of 70.8%. Results of responses from round two are displayed in Table 2.

Table 2
Delphi Study Round Two: Level of Agreement with Ranked Categories of Retention Problems (n = 17)

Problem	M	SD	Level of Agreement*
Scheduling difficulties	4.12	.93	Agree
Guidance counselor support	3.94	1.30	Agree
Image of agriculture	3.82	.81	Agree
Competition from other educational programs in school	3.82	1.13	Agree
College entrance requirements	3.82	.88	Agree
Integrating low and high performance students	3.76	1.25	Agree
Graduation requirements- not enough time for agriculture courses	3.59	1.42	Agree
Students active in other programs, activities, etc.	3.41	1.28	Uncertain
Administrative support	3.29	1.49	Uncertain
Block scheduling	3.19	1.28	Uncertain
Image of the agriculture program	3.12	1.17	Uncertain
Teacher commitment to recruiting	3.06	1.60	Uncertain
School policies	2.94	1.34	Uncertain
Parental support	2.76	1.64	Uncertain
Teacher quality	2.71	1.61	Uncertain
Community support	2.71	1.49	Uncertain
Type of curriculum – too traditional	2.71	1.49	Uncertain
Early dismissal (seniors get part of day off)	2.65	1.32	Uncertain
SAE participation	2.59	1.18	Uncertain
Quality of agriculture course instruction	2.53	1.46	Uncertain
Quality of agriculture curriculum	2.47	1.50	Disagree
Employment opportunities agriculture	2.41	1.06	Disagree
Program quality	2.41	1.46	Disagree
Maintaining student interest	2.35	1.06	Disagree
Competition from vocational-technical schools	2.31	1.14	Disagree
School dropouts (GED)	2.24	1.15	Disagree
Focus of program on leadership	1.88	1.17	Disagree
FFA activities	1.59	.94	Disagree

*1.00 – 1.49 = Strongly Disagree, 1.50 – 2.49 = Disagree, 2.50 – 3.49 = Uncertain, 3.50 – 4.49 = Agree, 4.50 – 5.00 = Strongly Agree.

As noted in Table 2, respondents either agreed or were uncertain about 20 of the 28 items in round two. Respondents agreed that six of the items were problems, but expressed opinions categorized as "uncertain" on 14 statements. The items with which teachers most agreed upon as being problems in retaining students in agriculture programs centered around scheduling difficulties, guidance counselor support, dealing with the image of agriculture, competition from other educational programs, meeting college entrance requirements, integrating low and high performance students into agriculture courses, and coping with increased graduation requirements for students. High standard deviations were noted in several problem areas, including parental support (SD = 1.64), teacher quality (SD = 1.61), and teacher commitment to recruiting (SD = 1.60), indicating a high level of variance in attitudes toward the inclusion of these items as problems to retention.

Respondents disagreed that FFA activities, focus of the program on leadership, opportunity to drop out of school and obtain a graduate equivalence diploma, competition from other vocational-technical schools, maintaining student interest, quality of the agriculture program, employment opportunities in agriculture, or quality of the agriculture program curriculum were problems in retaining students in the program.

In round three respondents were sent results from round two and asked to provide a dichotomous indication of whether they agreed or disagreed that each of the 28 items were indeed problematic to the retention of students. They were also asked to provide comments if they did not agree with the summary findings. Twenty-one of the 24 panel members responded in round three for an 87.5% response rate. Table 3 contains summary data for round three.

Table 3
Delphi Round Three: Level of Agreement with Retention Problems Identification (n = 21)

Problem	Agree (%)	Disagree (%)
Scheduling difficulties	100.0	0.0
Guidance counselor support	95.2	4.8
Students active in other programs, activities, etc.	95.2	4.8
Image of agriculture	85.7	14.3
Graduation requirements- not enough time for agriculture courses	81.0	19.0
College entrance requirements	76.2	23.8
Block scheduling	71.4	28.6
Competition from other educational programs in school	66.7	33.3
Image of the agriculture program	61.9	38.1
Integrating low and high performance students	57.1	42.9
Teacher commitment to recruiting	47.6	52.4
Teacher quality	47.6	52.4
Early dismissal (seniors get part of day off)	42.9	57.1
Administrative support	38.1	61.9
School policies	38.1	61.9
Parental support	38.1	61.9
Type of curriculum – too traditional	38.1	61.9

Table 3 (continued)
Delphi Round Three: Level of Agreement with Retention Problems Identification (n = 21)

Problem	Agree (%)	Disagree (%)
SAE participation	38.1	61.9
Quality of agriculture course instruction	38.1	61.9
Community support	33.3	66.7

As indicated in Table 3, all respondents considered scheduling difficulties to be a problem to student retention. Likewise, guidance counselor support, student active in other activities and programs, image of agriculture, graduation requirements, and college entrance requirements were listed by over three-fourths of the respondents as problems to student retention. By contrast, less than half of the respondents agreed that community support, quality of instruction, SAE participation, type of curriculum, parental support, school policies, administrative support, early dismissal of students to work, teacher quality, or teachers' commitment to recruiting were problems in retaining students.

To reflect comments from the respondents in earlier rounds, items were modified and mailed as statements in a fourth-round questionnaire. Twenty-two of the 24 members returned questionnaires in this final round for a response rate of 91.7%. Table 4 contains the results of this round.

As indicated in Table 4, at least eighty percent of the respondents agreed that scheduling difficulties, lack of guidance counselor support, the image of agriculture in general, increased graduation requirements, scheduling barriers created by college entrance requirements, competition from other school activities, block scheduling, the image of the local agriculture program, and the quality of the local agriculture instructor, were problems in retaining students in high school agriculture programs. Less than one-third of the respondents agreed that lack of support from parents, a traditional curriculum, required SAE participation, low quality instruction, or lack of community support posed problems to the retention of students in high school agricultural education programs.

Table 4
Delphi Round Four: Level of Agreement with Retention Problems Identification (n = 22)

Statement	Agree (%)	Disagree (%)
Difficulties in scheduling courses to meet graduation requirements and/or college admission requirements are an obstacle to retaining students in agriculture courses.	100.0	0.0
Lack of support from guidance counselors is a problem in re-enrolling students in agriculture courses.	95.5	4.5
Increased graduation requirements do not allow enough time for students to continue enrollment in agriculture courses.	90.9	9.1

Table 4 (continued)
Delphi Round Four: Level of Agreement with Retention Problems Identification (n = 22)

Statement	Agree (%)	Disagree (%)
Courses needed to meet college entrance requirements do not allow enough time for students to continue enrollment in agriculture courses.	90.9	9.1
The image of agriculture is an obstacle to retaining students into agriculture courses.	90.9	9.1
Students are so active in other school activities and programs that they do not have time to re-enroll in agriculture courses.	86.4	13.6
Block scheduling prevents students from re-enrolling in agriculture courses.	81.8	18.2
The image of the local agriculture program is a problem in retaining students in agriculture courses.	81.8	18.2
The quality of the local agriculture teacher is an obstacle to keeping students in the agriculture program.	81.8	18.2
The integration of low and high performance students in the agriculture program is a problem in retaining students in agriculture courses.	50.0	50.0
The lack of teacher commitment to encouraging students to remain in the program is a problem to student retention.	40.1	59.9
Early dismissal practices for seniors are problematic to retaining students in the agriculture program.	36.4	63.6
Lack of support from administrators is a problem in re-enrolling students in agriculture courses.	36.4	63.6
Local school policies prevent students from re-enrolling in agriculture courses.	36.4	63.6
Lack of support from parents is a problem in re-enrolling students in agriculture courses.	31.8	68.2
Curriculum that is too traditional is a problem in retaining students.	31.8	68.2

Table 4 (continued)
Delphi Round Four: Level of Agreement with Retention Problems Identification (n = 22)

Statement	Agree (%)	Disagree (%)
Required participation in SAE programs is an obstacle in retaining students in agriculture courses.	31.8	68.2
Low quality instruction discourages students from re-enrolling in agriculture courses.	31.8	68.2
Lack of community support is a problem in re-enrolling students in agriculture courses.	31.8	68.2

Conclusion

The major problems identified by the Delphi technique in the successful retention of students in high school agricultural education programs were: scheduling difficulties, lack of guidance counselor support, the image of agriculture, increased graduation requirements, scheduling barriers created by college entrance requirements, competition from other school activities, block scheduling, the image of the local agriculture program, and the quality of the local agriculture instructor.

Implications and Recommendations

Retention of students in high school agriculture programs is imperative to enrollment into college-level agricultural majors (Dyer, Lacey, & Osborne, 1996). If students become disillusioned and drop out of high school agriculture programs, their interest may not be sparked enough for them to consider enrollment into colleges of agriculture. Those talents are likely to be lost to the agricultural industry.

As indicated by the results of the Delphi technique, five of the nine problems identified were scheduling-related problems. Difficulties in scheduling courses due to increased graduation and college entrance requirements received unanimous agreement from the respondents as being an obstacle to retaining students. The second most agreed upon response was the lack of support from guidance counselors, followed by the problems of increased graduation requirements and meeting college entrance requirements. Teachers and teacher educators need to take a proactive approach to dealing with scheduling problems. Teachers and teacher educators need to take a proactive approach to dealing with scheduling problems.

The image of agriculture, the image of the local agriculture program, and the quality of the agriculture teacher were identified as problems in retaining students. Have agriculture programs and teachers been reluctant to divest themselves from the past? While many agricultural education programs have modified their course titles to suggest a more modern or "academic" focus to their curriculum, anecdotal evidence suggests that program structure remains focused around traditional production agriculture subject matter. This may lead counselors, administrators, and/or admission officials to view Agricultural Education courses as failing to contribute to the academic preparation of students pursuing a college preparatory curriculum. Again, teachers and teacher educators need to take a proactive approach to dealing with these issues.

Problems dealing with program image and teacher quality may indicate a problem with teacher preparation and inservice programs. It is interesting to note that while agricultural education as a whole has made a concerted effort to change its image since the enrollment losses in the early 1980s, the image of agriculture and that of the local agricultural education program still appears to be obtrusive some twenty years later. A generation of teachers has entered and left the profession during this time period, yet image problems still exist. If real change is to be made, it is likely that change will begin with the preparation of teachers in teacher education programs. These programs should assume an active role in preparing teachers to develop positive program and professional images. In addition, further research should be initiated to formulate practical solutions to the image problems of agricultural education programs for the new millennium.

Block scheduling was identified as a problem to retention. This was an unexpected finding since a purpose of block scheduling is to make courses more accessible to students. One of the lauded benefits of the block scheduling model is its ability to allow students to meet increased graduation and university admission requirements, yet still be able to enroll in elective courses such as agricultural education (Carrol, 1990). Why have agricultural education programs failed to flourish using this type of scheduling? Have agricultural educators failed to adapt to the changing needs and expectations of college-bound students? Has block scheduling disrupted students' programmatic participation in FFA and SAE? Additional research is needed in this area to further define the limitations of block scheduling and/or teacher attitudes toward integrating agricultural instruction into block scheduling. In addition, further study is needed to develop a curriculum-based model for agricultural education that allows courses to be scheduled around the curricular needs of students.

Interestingly, items such as parental and community support were not viewed as problems to the successful retention of students. Agriculture teachers could draw upon and target this support in helping to address those areas identified as problematic. In addition, teachers could likely gain much in terms of support and understanding by teaming with teachers of science, math, and English, social studies, etc.

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Problems in Student Retention: A Delphi Study of Agriculture Teacher Perceptions

A Critique

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Overview

The authors used the Delphi technique to identify the major problems facing high school agriculture teachers in retaining students in secondary agriculture programs. Data were collected from a nationwide sample of 24 teachers from secondary agriculture education programs that were considered by teacher educators and state supervisors to be excellent in their ability to recruit and retain students. A total of twenty-eight problems were identified. Eighty percent of the teachers involved agreed on nine major retention problems identified.

Strengths

A major strength of the study was that a national sample of teachers from four regions of the country were included. The Delphi technique was used appropriately and according to data listed in the tables, participation increased in later rounds from 17 to 22. Agreement was reached by 80 percent of the teachers on nine of the 28 items identified. The authors also show the items identified but not receiving wide agreement.

Concerns

One concern was that the authors stated that the population for the study consisted of all high school agriculture teachers. Yet, teacher educators and state staff were requested to nominate teachers from secondary agricultural education programs that were considered "outstanding" in their ability to recruit and retain students. Perhaps the latter rather than the former comprise the population for the study.

Questions

Who knows best what problems exist in the retention of high school agriculture students? Perhaps former students could provide more realistic answers on a case by case basis of the major reasons why they discontinued their high school agricultural studies. Also, is it valid to assume that students who discontinue their high school agricultural studies will not enroll in an agricultural college? Scheduling difficulties emerged as a major problem. Perhaps students were substituting advanced college preparatory courses for agriculture courses in preparation for higher-level college collage courses.

Commendations

The authors are to be commended for conducting a national study of an important issue using an approved research technique that solicits open-ended responses from the participants, then seeks agreement. Specific issues were identified; some of which can be improved by intervention of teachers of agriculture, administrators, and school officials. Results of the study have given educational decision-makers important information on where to start the intervention.

Predicting College Agriculture Students' Academic Performance And Retention: A Trend Study

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Abstract

Universities across the nation have established criteria in the selection of students for admission. This correlational study was conducted to determine predictors of academic performance and retention of freshmen in a college of agriculture. Freshmen enrolled in a college-wide learning and development course in the Fall of 1997 (n = 245) and 1998 (n = 195) at the University of Missouri participated. The following admission criteria were investigated as possible predictors of academic performance and retention: ACT examination, high school core grade point average (GPA), and high school class rank. In addition, students' preferred learning styles were investigated as a possible predictor of academic performance and retention. Regression analysis was utilized to account for the variance in students' cumulative GPA at the completion of the freshmen academic year. Step-wise discriminant analysis was performed to build a predictive model that could determine whether a linear combination of learning style, ACT score, high school class rank, and high school core GPA could be used to predict student enrollment status for the fall semester of the sophomore year.

Learners preferring a field-independent learning style exhibited a tendency for greater academic performance than did their field-dependent peers in the first year of college. The best predictor of academic performance during the first year of college for 1997 freshmen was a combination of their high school core GPA and ACT score. However, high school core GPA alone was the best predictor of college academic performance for freshmen who began their college career in 1998. Furthermore, learning style was not a predictor of students' academic performance during their first year of enrollment in a college of agriculture. Only the traditional university admission variable of high school core GPA was successful in predicting students' first year cumulative GPA. In the current study, the traditional criteria used for college admission was found to have limited value in predicting agriculture students' retention. The study raises questions regarding the effectiveness of current college admission variables as predictors of agriculture students' academic performance and retention.

Introduction/Theoretical Framework

Universities across the nation have established criteria in the selection of students for admission. While the selection criteria vary among universities, most universities use some combination of high school grade point average, high school class rank, and ACT examination. However, are these admission criteria valid in predicting academic performance and retention of agriculture students? Can certain variables be added or excluded from such admission equations to provide more accurate and efficient selection criteria for college of agriculture students?

Students' academic performance and their continued enrollment are a concern for universities and their respective colleges. Several studies have placed high monetary values on student retention (Dyer, Lacey, & Osborne, 1996; Glennen, Farren, & Vowell, 1996). Vernon (1996) noted that factors other than academic performance influence student retention. Dyer and Breja (1999) reported that retention could be predicted by examining the criteria by which students were admitted. They further indicated that traditional admission criteria were not the best predictors of academic performance and retention of agriculture students. Enrollment in secondary agriculture classes and agricultural experience were two factors that appeared to have a more accurate prediction value of student retention.

In addition to research concerning admission variables, research has been conducted regarding the relationship between students' learning styles and academic performance (Witkin, 1973; Gregorc, 1979; Garger & Guild, 1984; Claxton & Murrell, 1987; Schroeder, 1993). These studies concluded that when learning styles were considered in the teaching-learning process, student achievement was enhanced. Regarding the relationship between learning styles and retention, Matthews (1996) concluded that the interaction of learning style, race, and gender could be utilized to predict students' retention in postsecondary institutions. Schroeder (1993) acknowledged that being cognizant of and accommodating variations in learning styles could improve curricula, the teaching-learning process, and ultimately the retention of students in higher education.

Gregorc (1979) described a person's learning style as consisting of distinct behaviors which serve as indicators of how a person learns and adapts to his/her learning environment. The most extensively researched and applied learning style construct has been the field-dependence/independence dimension (Guild & Garger, 1985). Chickering (1976) noted that the field-dependence/independence dimension had major implications for college admissions and for faculty who make decisions about learning environments and practices.

Individuals who prefer a field-dependent learning style tend to have a global perception, have a more difficult time solving problems, are more attuned to their social environment, learn better when concepts are humanized, and tend to favor a spectator approach to learning. Additionally, individuals preferring a field-dependent learning style have been found to be more extrinsically motivated when organization and structure is provided by the teacher (Witkin et al., 1977).

Conversely, individuals who prefer a field-independent learning style tend to view concepts more analytically, therefore finding it easier to solve problems. Individuals preferring a field-independent learning style are more likely to favor learning activities that require individual effort and study. In addition, they prefer to develop their own structure and organization for learning, are intrinsically motivated, and are less receptive to social reinforcement. (Witkin et al., 1977).

Recent studies have focused on assessing the learning styles of students in colleges of agriculture. Learning styles have been found to have a positive relationship with academic performance, as measured by grade point average (Torres, 1993; Torres & Cano, 1994), performance in agriculture courses (Garton, Dauve, & Thompson, 1999), and overall success in higher education (Cano & Porter, 1997; Cano, 1999).

Previous research has identified students' learning styles and reported associations between learning style and academic performance and retention. However, data is lacking that describes the relationship between university admission criteria and learning styles to students' academic performance and retention in colleges of agriculture. Universities use selected criteria to determine if students are likely to be successful in their academic endeavors. By analyzing the admission criteria of groups of students who have been successful against groups who have not, the possibility exists to classify subsequent applicants for retention purposes based upon an analysis of admission criteria. Consequently, what are the best predictors of students' academic performance and retention; and further, are there emerging trends or patterns within such predictor variables? Possessing this knowledge could provide faculty and academic advisors with the necessary information to assist at-risk students.

Purpose/Objectives

The purpose of this study was to determine predictors of academic performance and retention of freshmen in the College of Agriculture, Food and Natural Resources at the University of Missouri. The specific objectives of the study were to:

1. Describe the relationship between students' learning styles and academic performance as measured by cumulative grade point average at the completion of the freshmen academic year.
2. Determine the best predictors of academic performance as measured by cumulative grade point average at the conclusion of the freshmen academic year.
3. Determine whether a linear combination of university admission variables and/or learning style could predict the retention of students for enrollment in the sophomore year.

Methods/Procedures

Population and Sample

The target population for this correlational trend study was freshmen entering the College of Agriculture, Food and Natural Resources at the University of Missouri in the Fall of 1997 ($\underline{N} = 326$) and 1998 ($\underline{N} = 338$). The accessible sample consisted of intact groups of freshmen enrolled in a college learning and development course in the Fall of 1997 ($\underline{n} = 245$) and 1998 ($\underline{n} = 195$). Krathwol (1998) described a trend study as one that follows the changes in a particular population where the sample as well as the population itself changes over time.

Instrumentation

The Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, & Karp, 1971) was administered to assess the preferred learning style of students as field-dependent or field-independent. The possible range of scores on the GEFT is zero to 18. Individuals scoring 11 or less were considered to prefer a field-dependent learning style, while individuals scoring 12 or greater were considered to prefer a field-independent learning style.

The GEFT is a standardized instrument that has been used in educational research for more than 25 years (Guild & Garger, 1985). The validity and reliability of the GEFT was established by the developers of the instrument. The GEFT is a timed test, therefore internal consistency was measured by treating each section as split halves ($\underline{r}$ = .82) (Witkin et al., 1971).

Data Collection and Analysis

The GEFT was administered to Fall 1997 and 1998 freshmen enrolled in a college learning and development course during the second week of the semester. Academic performance was measured by cumulative grade point average at the completion of the freshmen academic year. University admission variables included ACT score, high school class rank, and high school core grade point average. High school core grade point average was calculated based on courses required by the university for admission, and was determined from university admission data. Retention was determined based on enrollment status at the beginning of the first semester of the sophomore year.

Descriptive statistics were generated on GEFT scores and academic admission variables (ACT, high school core GPA, and high school rank). Pearson product-moment correlation coefficients were calculated between GEFT scores and academic admission variables and were interpreted using Davis=s (1971) descriptors. Regression analysis was used to explain variance in students= cumulative GPA at the completion of the freshmen academic year. Step-wise discriminant analysis was performed to build a predictive model of independent variables that could determine whether a linear combination of GEFT score, ACT score, high school class rank, and high school core GPA could be used to predict student enrollment status for the fall semester of the sophomore year. An alpha level of .05 was established a priori.

Results/Findings

The first objective sought to describe the relationship between students' learning styles and academic performance at the completion of the freshmen academic year. In 1997, a majority (73%) of the students possessed a preference for a field-independent learning style (Table 1). The remaining students (27%) preferred a field-dependent learning style. Similar results were found in 1998 where a majority (62.5%) of the students possessed a field-independent learning style with the remaining students (37.5%) preferring a field-dependent learning style. Students were grouped according to cumulative grade point average at the completion of the freshmen academic year and categorized by their learning style preference.

Table 1
Relationship Between Learning Style and Academic Performance at the Completion of the Freshmen Academic Year

	1997 (n = 245)				1998 (n = 195)			
	Field-Dependent		Field-Independent		Field-Dependent		Field-Independent	
Cumulative GPA	n	%	n	%	n	%	n	%
3.50 - 4.00	7	2.9	41	16.7	6	3.1	17	8.7
3.00 - 3.49	15	6.1	50	20.4	10	5.1	29	14.9
2.50 - 2.99	22	9.0	45	18.4	22	11.3	36	18.5
Total (≥2.50)	44	(66.6)	136	(76.0)	38	(52.0)	82	(67.0)
2.00 - 2.49	14	5.7	27	11.0	20	10.3	17	8.6
1.50 - 1.99	5	2.0	7	2.9	11	5.6	15	7.7
below 1.49	3	1.2	9	3.7	4	2.1	8	4.1
Total (<2.50)	22	(33.3)	43	(24.0)	35	(48.0)	40	(33.0)
Grand Total	66	26.9	179	73.1	73	37.5	122	62.5

Note. 1997: $r = .21$; Cumulative GPA $M = 2.88$, $SD = .70$; GEFT $M = 13.3$, $SD = 3.88$
1998: $r = .15$; Cumulative GPA $M = 2.62$, $SD = .74$; GEFT $M = 12.5$, $SD = 4.69$

An analysis revealed that 67% of the 1997 freshmen possessing a field-dependent learning style achieved a cumulative GPA of 2.5 or greater for their freshmen academic year, while 33% earned less than a 2.5 cumulative GPA. Conversely, 76% of the students possessing a preference for a field-independent learning style achieved a GPA of 2.5 or greater at the culmination of the freshmen academic year, while the remaining 24% earned less than a 2.5 cumulative GPA. A low positive relationship ($r = .21$) existed between students' GEFT scores and their cumulative freshmen year GPA.

Similar results were found when analyzing the 1998 data. Fifty two percent of the 1998 freshmen possessing a field-dependent learning style achieved a cumulative GPA of 2.5 or greater for their freshmen academic year, while 48% earned less than a 2.5 cumulative GPA. Further analysis revealed that 67% of the students preferring a field-independent learning style achieved a GPA of 2.5 or greater at the culmination of the freshmen academic year, while the remaining 33% earned less than a 2.5 cumulative GPA. A low positive relationship ($r = .15$) existed between students' GEFT scores and their cumulative freshmen year GPA.

The second research objective sought to determine the best predictors of students' academic performance at the completion of the freshmen academic year. Substantial positive intercorrelations were found between the predictor variables of ACT and high school core GPA ($r = .56$ in 1997 and $r = .55$ in 1998) and high school class rank ($r = .54$ in 1997 and $r =. 50$ in 1998) (Table 2). In addition, a very strong positive association was found between high school core GPA and high school class rank ($r = .86$ in 1997 and $r = .88$ in 1998). Meanwhile, low positive associations were identified between GEFT scores and the predictor variables of high school core GPA (r = .22 in 1997 and r = .25 in 1998) and high school class rank (r = .24 in 1997 and r = .23 in 1998). A moderate positive association was found between GEFT and ACT scores (r = .36 in 1997 and r = .44 in 1998). Substantial positive correlations were identified between the criterion variable (cumulative GPA) and high school core GPA (r = .61 in 1997 and r = .57 in 1998) and high school class rank (r = .52 in 1997 and r = .49 in 1998).

Table 2
Intercorrelations of Variables Regressed on Cumulative Grade Point Average at the Conclusion of the Freshmen Academic Year

Variable	1	2	3	4	5
	1997 (n = 245)				
1. GEFT	--	.36	.22	.24	.21
2. ACT		--	.56	.54	.47
3. High school core GPA			--	.86	.61
4. High school class rank				--	.52
5. Cumulative GPA					--
	1998 (n = 192)				
1. GEFT	--	.44	.25	.23	.15
2. ACT		--	.55	.50	.38
3. High school core GPA			--	.88	.57
4. High school class rank				--	.49
5. Cumulative GPA					--

Note. 1997: ACT M = 24.8, SD = 4.0; High school core GPA M = 3.38, SD = .52; High school class rank (percentile) M = 77.6, SD = 18.4
1998: ACT M = 23.8, SD = 3.9; High school core GPA M = 3.27, SD = .54; High school class rank (percentile) M = 73.7, SD = 19.7

The intercorrelation matrix of predictor variables revealed the presence of multicollinearity, a potential violation of the assumptions in using multiple linear regression. Using guidelines offered by Lewis-Beck (1980), each independent variable was regressed on the remaining independent variables. Regressing the independent variables on high school core GPA resulted in R^2 values of .75 and .79, respectively for 1997 and 1998, indicating a high degree of multicollinearity. Furthermore, R^2 values of .74 (1997) and .77 (1998) were found when the independent variables were regressed on high school class rank, again indicating a high degree of multicollinearity. Due to a lower correlation coefficient with the criterion variable, high school class rank was excluded from consideration in the regression equation.

Step-wise multiple regression was used to explain the variance in student cumulative GPA at the completion of the freshmen academic year. An analysis of the 1997 freshmen indicated that 39% of the variance in their first year cumulative GPA could be explained by a linear combination of high school core GPA and ACT score (Table 3). Students' GEFT scores did not enter the regression equation. By comparison, only 31% of the variance in the first year cumulative GPA of the 1998 freshmen could be explained and was accounted for by one variable, high school core GPA. Students' GEFT scores and ACT scores were excluded from the regression equation.

Table 3
Step-wise Regression of High School Core GPA and GEFT Score on Cumulative GPA at the Conclusion of the Freshmen Academic Year

	1997 (n = 245)			1998 (n = 192)		
Variable	R^2	b	t	R^2	b	t
High school core GPA	.37	.69	8.11*	.31	.55	8.96*
ACT	.39	.03	3.12*	--	--	--
(Constant)		-.24			-.29	

*$p < .05$

The third objective sought to determine the best predictors of retention as evidenced by students' continuing enrollment at the beginning of the sophomore year. To accomplish this purpose, a discriminant analysis procedure was used to generate a predictive model of linear relationships between learning style (GEFT score) and admission criteria (ACT score, high school core GPA) and continued enrollment. Descriptive data for the discriminating variables used for the model are presented in Table 4. Again, due to the presence of multicollinearity between the variables high school core GPA and high school class rank, the latter variable was omitted from consideration. In addition, due to missing data on discriminating variables, the step-wise discriminant analysis procedure used mean scores for eight cases in 1997 and six in 1998.

Table 4
Means and Standard Deviations of Discriminating Variables

Discriminating Variables	1997 (n = 245)				1998 (n = 192)			
	Not-continuing (n = 24)		Continuing (n = 221)		Not-continuing (n = 29)		Continuing (n = 163)	
	M	SD	M	SD	M	SD	M	SD
GEFT	14.3	3.5	13.1	3.8	13.2	4.6	12.4	4.8
ACT	23.9	2.8	24.8	4.1	23.3	3.6	23.9	3.9
H.S. Core GPA	3.14	.38	3.41	.50	2.95	.47	3.35	.52

An analysis of the 1997 freshmen produced a model with two discriminating variables, GEFT score and high school core GPA (Table 5). ACT score was eliminated as a discriminating variable. The centroid for students continuing their enrollment was significantly different from those students who did not return for their sophomore year (Wilks' Lambda = .95, $p < .002$). The discriminating power of the discriminant function, expressed as an eigenvalue, was .26. The degree of association between the groups and the discriminant scores was expressed as a canonical correlation of .45. The discriminant analysis model successfully predicted group membership in 67% of the cases for non-continuing students and 67% of the cases for continuing students (Table 6). Overall the discriminant function was accurate in predicted 67% of the cases.

Table 5
Summary Data for Discriminant Analysis for 1997 Freshmen (n = 245)

Discriminating Variable	b	s	Group	Centroids
GEFT	-.71	-.51	Not-continuing	-.73
H.S. Core GPA	.88	.72	Continuing	.07
Eigenvalue	R_c		Wilks' Lambda	$p < .002$
.26	.45		.95	

Table 6

Classification of Cases for 1997 Freshmen ($n = 245$)

Group	No. of Cases	Predicted Group	
		Not-continuing	Continuing
Not-continuing	24	16 (66.7%)	8 (33.3%)
Continuing	221	73 (33.0%)	148 (67.0%)
Percent of cases correctly classified: 66.9%			

An analysis of the 1998 freshmen was conducted to determine if trends or patterns were emerging in predicting retention of college agriculture students into the second year of college. The analysis produced a model with one discriminating variable, high school core GPA (Table 7). ACT and GEFT score were eliminated as discriminating variables. The centroid for students continuing their enrollment was significantly different from those students who did not return for their sophomore year (Wilks' Lambda = .93, $p < .002$). The discriminant analysis model successfully predicted group membership in 59% of the cases for non-continuing students and 64% of the cases for continuing students (Table 8). In total, the discriminant function correctly predicted 63% of the cases.

Table 7

Summary Data for Discriminant Analysis for 1998 Freshmen ($n = 192$)

Discriminating Variable	b	s	Group	Centroids
H.S. Core GPA	.77	.55	Not-continuing	-.66
			Continuing	.12

Eigenvalue	R_c	Wilks' Lambda	$p < .002$
.08	.27	.93	

Table 8
Classification of Cases for 1998 Freshmen (n = 192)

		Predicted Group	
Group	No. of Cases	Not-continuing	Continuing
Not-continuing	29	17 (58.6%)	12 (41.4%)
Continuing	163	59 (36.2%)	104 (63.8%)
Percent of cases correctly classified: 63.0%			

Conclusions/Implications/Recommendations

Learners preferring a field-independent learning style exhibited a tendency for greater academic performance than their field-dependent peers in the first year of college. A greater percentage of students with a field-independent learning style preference, attained a cumulative GPA of 2.5 or greater than students with a field-dependent learning style preference. Does this imply that students possessing a preference for a field-independent learning style were academically superior? Perhaps a more plausible conclusion would be that instructors' teaching styles, course assignments/projects, and course assessments were better suited to the strengths of field-independent learners. While students with the field-independent learning style preference exhibited higher grade point averages in general, learning style had no predictive value when other variables were considered in predicting academic performance in the first year of college.

The best predictor of academic performance during the first year of college for 1997 freshmen was a combination of their high school core grade point average and ACT score. However, high school core grade point average alone was the best predictor of college academic performance for freshmen who began their college career in 1998. Although Witkin, et. al. (1977) noted that field-independent learners tend to favor careers in areas such as agriculture, GEFT score was not a predictor of students' academic performance during their first year of enrollment in a college of agriculture.

Only the traditional university admission variable of high school core GPA was successful in predicting students' first year cumulative GPA. High school core GPA accounting for approximately one-third of the variance in students' academic performance in the first year of college. Prior research also identified high school grade point average as a predictor of students' first year academic performance (Murtaugh, et. al., 1999; Wold &Worth, 1991). The findings of the current study and those of prior research should raise concern with the use of university wide admission criteria as adequate predictors for the success of students enrolled in colleges of agriculture. What additional variables account for the remaining variance in the academic performance of first year students? Additional research is needed to establish valid and reliable predictors of student success in colleges of agriculture.

In the current study the criteria used for college admission was found to have limited value in predicting agriculture student retention. While high school core GPA and GEFT score appeared to influence a student's choice to continue his/her education in 1997, this pattern was not repeated in the subsequent year. For 1998 freshmen, high school core GPA was the lone variable found to have predictive value for retaining agriculture students for the sophomore year. Should other variables be considered in admitting students to colleges of agriculture? Further quantitative and qualitative research is needed to identify if other variables exist that can predict whether students choose to continue or discontinue their education. Further research is needed to determine the strength of and establish trends between this as well as other variables regarding student performance and retention in colleges of agriculture.

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Predicting College Agriculture Students' Academic Performance And Retention: A Trend Study

A Critique

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Overview

This correlation study was conducted to determine predictors of academic performance and retention of freshmen in the College of Agriculture at the University of Missouri. Results indicated that students preferring a field independent learning style exhibited a tendency for greater academic performance than did their field dependent peers in the first year of college. The high school core grade point average was found to be the best predictor of college academic performance and for retaining agriculture students into the sophomore year.

Strengths

The problem was well stated. The authors pointed out that although previous research has been reported, data were lacking that describes the relationship of university admission criteria and learning styles to student' academic performance and retention in colleges of agriculture. Existing data from university records were used as admission criteria. Also, two intact groups of college freshmen were utilized to begin a trend study and to compare consistency of results. These data should be useful in continuing the trend study in the future. Resulting tangible, usable outcomes were also strengths of the study.

Concerns

The authors concluded that the criteria used for college admission was found to have limited value in predicting agriculture student retention. They raised the question regarding whether additional variables should be considered in admitting students to colleges of agriculture. If identified, would it be feasible for such variables to be used in admitting students? Do colleges of agriculture want to take over what has traditionally been the university responsibility of admitting students? If so, would other departments, schools, and colleges within the university want to do the same?

Questions

What factors other than those studied might impact the academic performance and retention of students? Variables such as student's financial resources, concurrent need to work, health status, family support, mobility and others not included in the study may have influenced the outcomes? Are there other variables that should be included in the equation? The authors do raise the question in their summary statements.

Commendation

The study is important and was well conducted. It included tangible results that can be used immediately and it raised questions regarding the identification and use of additional or refined measures to predict student performance and retention in the future.

An Assessment Of Agricultural Education Graduates' Preparation For Careers In Teaching And Industry

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Abstract

This study investigated an agricultural education program's ability to prepare students for careers in teaching and industry positions within the agriculture, food, and fiber industry. The study sought to assess the employability skills needed by agricultural education graduates and evaluate the contribution of the agricultural education curriculum in developing these skills. This was a census study of agricultural education graduates at the University of Missouri from May 1989 through May 1998. Agricultural education graduates indicated the employability skills needed by teachers of agriculture did not differ from those skills needed by individuals with careers in the agriculture, food, and fiber industry. Ten out of fifteen employability skills were rated as having a major impact on the graduates' ability to successfully perform the responsibilities of their positions. Also, graduates indicated the agricultural education curriculum successfully prepared them for the employability skills needed for careers in teaching and industry. Graduates were satisfied with the overall quality of the agricultural education program and were especially satisfied with the professional competence of the agricultural education faculty. Graduates with careers in industry indicated they were receiving very little support upon graduation from the University. The future value of a degree from an institution of higher learning is of great importance as students look for a place to garner advanced learning. Therefore, the faculty at the University of Missouri must find a way to increase support for graduates with industry careers upon graduation. This support can increase the value of a degree and enhance continued graduate satisfaction in the program. Graduates with careers in teaching and industry were dissatisfied with the quality of computer support at the institution. Technology is an important part of current and future situations in education. It is imperative that the institution, college, and department at the University of Missouri continue to upgrade and implement new computer technologies for student use.

Introduction/Theoretical Framework

Agricultural education programs in colleges and universities have expanded their focus beyond the preparation of teachers to encompass more diverse educational opportunities designed to meet the needs of a broader base of students. Programs have been developed and redesigned around a broad curricula in hopes of carrying the profession into the 21st century. Scanlon, Bruening, and Cordero (1996) stated if agricultural education programs are to survive, they must be dynamic and able to adjust to new situations and environments that help to improve the on-the-job effectiveness of future graduates.

For more than a decade this effort to define the mission and purpose of agricultural education programs at the college/university level has challenged the profession. In 1990, Fuller, the distinguished lecturer at the professions' annual meeting, noted agricultural education programs must position themselves appropriately in the free market place of higher education and move beyond the preparation of teachers in agriculture. Several questions must be asked during this age of diversification. Will this diversification impact the quality of instruction students receive in a teacher preparation program? Will diversified programs adequately prepare agricultural education graduates to succeed in their chosen career track? Will this diversification impact the ability of agricultural education programs to meet the needs of a broadened curriculum base, while at the same time not sacrifice the preparation of teachers which continues to be the primary mission of most programs?

Agricultural education programs at the university level must continue to diversify to maintain enrollment levels for survival. Newcomb (1993) stated departments that intend to prosper must scan the horizon and identify needs that are not being adequately served and foster relationships with new client groups.

Barrick (1993) developed a conceptual model for the Department of Agricultural Education at The Ohio State University. In the model, diversity played a major role in the scope of the program. He noted that while teacher preparation is the central mission of an agricultural education program, departments must encompass more than teacher preparation in the teaching/learning process. In addition to teacher preparation, Barrick suggested agricultural education programs were capable of providing learning and career preparation in human resource development and management, leadership development, communications, and social science research methodology and data analysis.

Barrick's example illustrates the shift in scope of agricultural education programs in higher education across the country. It should be noted for this shift to be effective in meeting the needs of diverse students, programs should utilize follow-up procedures to ensure they are providing students with the necessary information to be successful in a variety of career opportunities.

Mattox (1974) concluded that a large percentage of prospective agriculture teachers, who had completed a teacher certification program, entered other careers or left teaching after a short period of time. In a study covering the past thirty years, Brown (1995) concluded that half of the agricultural education graduates elected not to enter the teaching profession. Vaughn (1999) stated that secondary agricultural education programs must attract and retain high quality teachers to ensure a successful future. Not only do programs have to provide high quality teachers to fill the current demand, but they must also focus on providing high quality industry professionals. Therefore, it is imperative that programs attract high quality students eager to be successful in a variety of career options and provide them with the tools necessary for success.

Agricultural education programs must maintain the satisfaction of students with varying interests and degree plans. Students in agricultural education programs must be prepared to enter the workforce in a variety of careers. With the shift in scope and expansion of opportunities within agricultural education, are programs capable of meeting the needs of students who possess diverse career interests? Can programs simultaneously prepare students for careers in teaching and the agriculture, food, and fiber industry?

Purpose/Objectives

The purpose of this study was to assess an agricultural education program's ability to prepare students for careers in teaching and industry positions in the agriculture, food, and fiber industry. To accomplish the purpose, this study sought to assess the employability skills needed by agricultural education graduates and to evaluate the contribution of the agricultural education curriculum in developing these skills. The following research objectives were formulated to guide the study:

1. Describe the employment and occupational status of agricultural education graduates.
2. Assess the employability skills needed by agricultural education graduates.
3. Assess the contribution of the agricultural education curriculum to the development of employability skills.
4. Assess the agricultural education program's ability to prepare students for careers in teaching and industry.

Methods/Procedures

The research method employed was descriptive survey. The population consisted of a census of agricultural education graduates ($\underline{N} = 105$) at the University of Missouri from May 1989 through May 1998.

A questionnaire with 67 forced-choice and three open-ended questions was utilized. The questionnaire consisted of six sections: educational status, occupational status, factors influencing position/occupational changes, educational experiences, program and advising, and open-ended questions. A panel of experts consisting of agricultural education faculty established content and face validity. A pilot test was conducted with 16 graduating agricultural education students to establish the instrument's reliability. Cronbach's alpha coefficients ranged from .82 for the quality of academic advising section to .69 for the employability skills section.

The Dillman Total Design Method (Dillman, 1978) was followed for the data collection process. Postcards announcing the forthcoming questionnaire were mailed two weeks prior to mailing the complete questionnaire package which consisted of a cover letter, questionnaire, and pre-paid return envelope. Follow-up consisted of a postcard sent to all nonrespondents ten days after the mailing of the complete package. A second complete package was mailed to nonrespondents ten days after the follow-up postcard. A total of 81 graduates responded for a response rate of 77%. Nonresponse error was controlled by comparing late respondents to on-time respondents as outlined by Krushat and Molnar (1993) who noted late respondents tend to reply similarly to nonrespondents. A comparison of these groups revealed no differences in the responses of late and on-time respondents.

Results/Findings

The first objective sought to describe the employment and occupational status of the agricultural education graduates. A majority of the graduates (87.7%) were employed full-time while a limited number (3.7%) were continuing their education on a full-time basis (Figure 1). A few of the graduates (3.7%) were continuing their education part-time and were employed.

The remaining graduates (4.9%) were classified as other and included employed part-time and caring for family/home full-time.

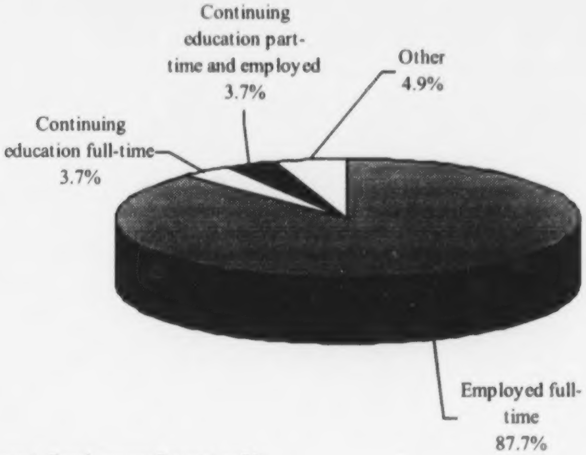

Figure 1. Employment Status (n=81)

The agricultural education graduates held a variety of occupations. The greatest number of graduates (63%) were employed as secondary agriculture teachers (Figure 2). Graduates also reported being employed in the areas of sales (12.3%), communications (6.2%), and industry education (7.4%). Industry education included extension, higher education, and technical support/service positions. A small number of graduates (3.7%) reported they were self-employed. Looking exclusively at individuals who graduated with teacher certification, approximately 90% taught secondary agriculture at some point and more than 75% indicated they were currently teaching in a secondary agriculture program.

The purpose of the second objective was to assess the employability skills needed by agricultural education graduates in their chosen careers. Graduates were provided with 15 employability skills and were asked to indicate the level of importance of each skill to the success of their occupation. For comparison purposes, graduates were categorized into two career areas: Teaching and industry (Table 1).

Graduates currently in a teaching career indicated verbal communication (M = 3.9) was the most important skill for career success. Other high ranking skills needed for career success included leadership (M = 3.9), written communication skills (M = 3.8), getting along with people (M = 3.8), planning and completing projects (M = 3.8), analyzing information to make decisions (M = 3.8), and defining/solving problems (M = 3.8). Overall 10 of the 15 employability skills had a mean importance rating of 3.5 or higher, indicating a need for the skills in performing the requirements of a career in teaching. None of the five remaining employability skills were rated below moderately important.

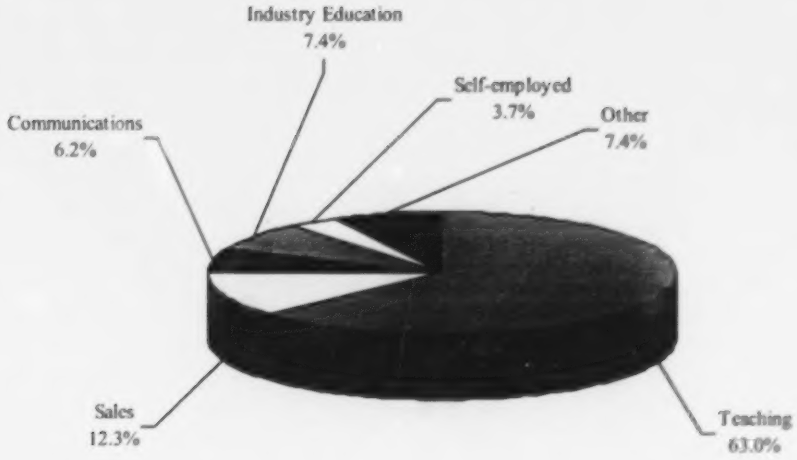

Figure 2. Occupational Status (n = 81)

Graduates working in industry indicated getting along with people (M = 3.8) was the most important skill for success in their occupations. Other important skills needed for success included verbal communication (M = 3.8), planning and completing projects (M = 3.7), and analyzing information to effectively make decisions (M = 3.7). Graduates with careers in industry rated nine of the 15 employability skills with a mean importance of 3.5 or higher, indicating a need for the skills in performing the requirements of their positions in industry. None of the remaining six employability skills were rated below moderately important.

A comparison of the employability skills needed by graduates possessing careers in teaching with graduates possessing careers in the agriculture, food, and fiber industry revealed no major differences. Graduates with teaching careers ranked leadership and written communication skills higher than graduates with careers in industry. Conversely, graduates with careers in industry ranked working with people of differing attitudes and opinions higher. The six lowest ranked employability skills were the same for both career options.

The third objective sought to assess the contribution of the agricultural education curriculum to the development of employability skills. Graduates were provided 15 employability skills and asked to indicate the agricultural education curriculum's contribution to the development of each skill (Table 2).

Table 1
Employability Skills Needed by Agricultural Education Graduates

Skills	Teaching (n=51) Rank	M	SD	Industry (n=29) Rank	M	SD
Verbal communication skills	1	3.96	.20	2	3.83	.38
Leadership skills	2	3.92	.27	8	3.66	.48
Written communication skills	3	3.88	.33	7	3.72	.45
Getting along with people	3	3.88	.33	1	3.86	.35
Planning and completing projects	5	3.82	.39	3	3.79	.41
Analyzing information to effectively make decisions	6	3.80	.40	3	3.79	.41
Defining and solving problems	6	3.80	.45	5	3.76	.44
Working as a team member	8	3.78	.42	10	3.48	.69
Working with different attitudes and opinions	9	3.76	.47	5	3.76	.44
Accessing and using a variety of information sources	10	3.73	.53	9	3.55	.57
Exercising the rights, responsibilities, and privileges of a citizen	11	3.49	.54	13	3.21	.73
Analyzing and drawing conclusions from various types of data	12	3.39	.63	10	3.48	.51
Understanding international issues	13	3.22	.76	15	3.07	.65
Understanding the interaction of humans and the environment	14	3.10	.83	12	3.28	.70
Understanding cultural and ethnic differences	15	3.06	.83	14	3.14	.74

Note. Scale: 1 = No Importance; 2 = Minor Importance; 3 = Moderate Importance; 4 = Major Importance

Table 2
Contribution of Agricultural Education Curriculum in Developing Employability Skills

	Teaching (n=51)			Industry (n=29)		
Skills	Rank	M	SD	Rank	M	SD
Verbal communication skills	1	3.47	.70	3	3.38	.73
Written communication skills	2	3.43	.64	1	3.69	.54
Working as a team member	3	3.33	.68	5	3.24	.74
Leadership skills	4	3.27	.70	6	3.21	.77
Accessing and using a variety of information sources	4	3.27	.78	2	3.41	.68
Defining and solving problems	6	3.25	.72	8	3.07	.88
Planning and completing projects	7	3.22	.61	7	3.17	.71
Analyzing information to effectively make decisions	8	3.06	.81	8	3.07	.75
Analyzing and drawing conclusions from various types of data	9	3.02	.73	10	2.93	.75
Working with different attitudes and opinions	10	2.96	.77	10	2.93	.84
Getting along with people	11	2.94	.83	4	3.34	.73
Understanding the interaction of humans and the environment	12	2.63	.77	13	2.62	.86
Exercising the rights, responsibilities, and privileges of a citizen	13	2.57	.81	12	2.76	1.02
Understanding international issues	14	2.33	.74	14	2.48	.63
Understanding cultural and ethnic differences	15	2.22	.81	15	2.24	.79

Note. Scale: 1 = No Contribution; 2 = Minor Contribution; 3 = Moderate Contribution; 4 = Major Contribution

Graduates teaching agriculture at the secondary level indicated the agricultural education curriculum had the greatest contribution toward the development of skills in verbal communication (M = 3.4), written communication (M = 3.4), working cooperatively and as a team member (M = 3.3), leadership (M = 3.2), accessing and using a variety of information sources (M = 3.2), defining/solving problems (M = 3.2), and planning and completing projects (M = 3.2). Graduates indicated the curriculum contributed least to their skill development in understanding international issues (M = 2.3) and understanding cultural and ethnic differences (M = 2.2).

Graduates with careers in industry indicated the agricultural education curriculum had between a moderate and major contribution toward nine of the 15 employability skills. Graduates indicated the curriculum had the greatest contribution toward developing skills in written communication (M = 3.7), accessing and using a variety of information sources (M = 3.4), verbal communication (M = 3.4), and getting along with people (interpersonal skills) (M = 3.3). Graduates indicated the curriculum contributed least to their skill development in understanding international issues (M = 2.5) and understanding cultural and ethnic differences (M = 2.2).

A comparison between career options indicated the only major difference, with regard to the contributions of the agricultural education curriculum, existed on the skill of getting along with people (interpersonal skills). Graduates with industry careers (M = 3.3) rated the agricultural education curriculum higher than graduates with teaching careers (M = 2.9) on the development of this skill.

The final objective sought to assess the agricultural education program's ability to prepare individuals for careers in teaching and industry. Two factors were considered: Quality of the program toward career preparation and academic advising. Graduates were asked to rate 16 statements regarding the quality of the agricultural education program toward their career preparation (Table 3).

Graduates in teaching careers indicated they were satisfied with the overall quality of the agricultural education program. The top five rated items for graduates in teaching careers were: Professional competence of the agricultural education faculty (M = 3.8), overall quality of the agricultural education program (M = 3.6), availability of required agricultural education courses (M = 3.6), job placement services (M = 3.5), and internship experiences (M = 3.5).

Graduates with positions in industry indicated they were also satisfied with the overall quality of the agricultural education program. Graduates with careers in industry ranked their top five items as follows: Internship experiences (M = 3.6), professional competence of agricultural education faculty (M = 3.5), availability of required agricultural education courses (M = 3.4), quality of students in agricultural education (M = 3.3), and quality of instruction in agricultural education courses (M = 3.2).

Graduates with careers in both teaching and industry ranked quality of computer support (M = 2.8, teaching; M = 2.4 industry) and classroom facilities in agricultural education (M = 2.8, teaching; M = 2.6, industry) as the two weakest areas of the program. A comparison of the two career options indicated the greatest difference existed regarding job placement services and support since graduation. Graduates with careers in teaching rated the statement "support since graduation" nearly three-quarters of a point higher and "job placement services" nearly a half a point higher than graduates with careers in industry.

Table 3
Quality of the Agricultural Education Program

Program Quality Statements	Teaching (n=51) Rank	Teaching (n=51) M	Teaching (n=51) SD	Industry (n=29) Rank	Industry (n=29) M	Industry (n=29) SD
Professional competence of agricultural education faculty	1	3.76	.48	2	3.48	.63
Overall quality of the program	2	3.59	.54	6	3.21	.62
Availability of required courses	3	3.55	.50	3	3.43	.57
Job placement services	4	3.53	.71	7	3.12	.73
Internship experiences	5	3.49	.80	1	3.61	.63
Support since graduation	6	3.42	.68	14	2.71	.96
Quality of instruction	7	3.35	.59	5	3.24	.58
Opportunity to evaluate teaching in required courses	8	3.33	.62	11	2.96	.71
Organization of the curriculum	9	3.27	.67	10	3.03	.68
Quality of students	9	3.27	.60	4	3.34	.61
Availability of student organizations	11	3.12	.71	13	2.86	.79
Quality of courses in preparing for graduate school	12	3.08	.80	12	2.94	.77
Quality of courses in preparing for employment	13	3.04	.72	8	3.07	.46
Availability of required courses outside agricultural education	14	2.90	.78	8	3.07	.59
Classroom facilities in agricultural education	15	2.78	.64	15	2.64	.83
Quality of computer support	16	2.76	.78	16	2.38	.77

Note. Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Excellent

Graduates were asked to indicate their level of satisfaction with the academic advising received (Table 4). Graduates with teaching careers were satisfied with the academic advising, ranking each quality statement between good and excellent. The highest rated items were: Opportunities for interaction with the agricultural education faculty (M = 3.6), adviser's interest in me as a person (M = 3.6), and availability of adviser (M = 3.6).

Table 4
Quality of Advising

Advising Quality Statements	Teaching (n=51) Rank	M	SD	Industry (n=29) Rank	M	SD
Interaction with the agricultural education faculty	1	3.63	.66	1	3.59	.63
Adviser's interest in me as a person	1	3.63	.77	1	3.59	.63
Availability of adviser	1	3.63	.69	3	3.55	.63
Adviser's help in planning degree program	4	3.40	.73	5	3.17	.71
Quality of career advising	5	3.28	.76	7	2.86	.76
Appropriateness of referrals to other campus resources	6	3.20	.75	4	3.26	.75
Clarity of degree requirements	7	3.04	.85	6	3.07	.80

Note. Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Excellent

Graduates with industry positions indicated they were also satisfied with their academic advising. They also ranked opportunities for interaction with the agricultural education faculty (M = 3.6), adviser's interest in me as a person (M = 3.6), and availability of adviser (M = 3.6) as the top three advising qualities. Quality of career advising (M = 2.9) was the lowest rated item.

Conclusions/Recommendations/Implications

Approximately 95% of the agricultural education graduates were gainfully employed, employed and continuing their education part-time, or continuing their education full-time. The remaining graduates were employed part-time or caring for their families in the home. The employment status of graduates provides evidence to the value of an agricultural education degree, whether that degree leads to employment opportunities or the pursuit of an advanced or professional degree.

A majority of the graduates were teaching agriculture at the secondary level and one-fourth of the graduates were employed in industry positions in the areas of sales, communications, and education. When considering only individuals who graduated in the teacher certification option, nine out of ten had taught at some point in their working career. Furthermore, three-fourths of these individuals indicated they were currently teaching agriculture at the secondary level. These findings exceeded national statistics that indicated only 56% of agricultural education graduates certified to teach entered teaching (Camp, 1998).

In general, the employability skills needed by teachers of agriculture did not differ from those skills needed by graduates with careers in the agriculture, food, and fiber industry. Using effective verbal communication skills was the highest rated employability skill. Ten of the fifteen employability skills were rated at or above 3.5, indicating these skills had a major impact on the graduates' ability to successfully perform the responsibilities of their positions.

Graduates indicated the agricultural education curriculum successfully prepared them for the employability skills needed for careers in teaching and industry. Of the ten employability skills rated as having a major impact on the ability to successfully perform the responsibilities of their job, graduates rated the agricultural education curriculum as having at least a moderate contribution to developing all ten skills.

Graduates indicated they were satisfied with the overall quality of the agricultural education program. Of the top five quality statements, graduates in both teaching and industry careers indicated they were especially satisfied with the professional competence of the agricultural education faculty. Graduates with careers in industry were most satisfied with internship opportunities provided to them while they attended the University. Graduates were also satisfied with the availability of required agricultural education courses.

Graduates with careers in teaching and industry indicated their experience with an adviser was positive. Graduates were satisfied with the ability to interact with the faculty and the adviser's interest in them and their interests. However, graduates with careers in industry rated the quality of career advising substantially lower than the other advising statements, implying a need for faculty improvement.

Graduates with careers in industry indicated they were receiving very little support upon graduation from the University. The future value of a degree from an institution of higher learning is of great importance as students look for a place to garner advanced learning. Therefore, it is recommended that the faculty in this program find a way to increase support for graduates with industry careers upon graduation. This support can increase the value of a degree and enhance continued graduate satisfaction in the program.

Graduates with careers in teaching and industry were both dissatisfied with the quality of computer support at the institution. Technology is an important part of the current and future situations in education. It is imperative that the institution, college, and department at this institution continue to upgrade and implement new computer technology for student use. Again, the availability of necessary technology can enhance the value of a degree and the satisfaction of graduates from a program.

The current findings give credence to the strength and versatility of the agricultural education curriculum, program, and advising in preparing individuals for careers in teaching and industry. The information gained from this study should be used in developing recruitment materials and promoting the agricultural education degree offered at the University of Missouri. The information should be shared with current students to dispel myths regarding the degree program and the program's ability to prepare students for careers in the agriculture, food, and fiber industry. Research regarding factors that influence students to select a career option should be undertaken to gain a perspective on the profile of students in each option. Furthermore, research should be expanded to investigate the factors that influence people to enter an industry or teaching profession upon graduation without regard to degree program area.

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An Assessment Of Agricultural Education Graduates' Preparation For Careers In Teaching And Industry

A Critique

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Overview

In this study, 105 agricultural education program graduates at the University of Missouri over a ten year period were surveyed to assess the ability of program to prepare graduates for teaching and industry positions in the agriculture, food and fiber industry. Eighty-one, or 77 percent responded to the survey. Overall, graduates indicated that they were satisfied with their preparation, advice and support. Graduates who were teaching expressed greater satisfaction than those employed in industry. The greatest dissatisfaction was expressed regarding computer support.

Strengths

The study included responses from graduates who were teaching as well as those from business and industry. The 77 percent response rate from a survey that included responses from graduates up to ten years ago is a compliment to the program in and of itself. Employability skills needed by graduates in teaching and industry were identified and ranked. Information about the quality of the agricultural education program were identified and ranked. The data can be used to improve the program in the future.

Concerns

The methodology section of the paper provided little information about the questionnaire development procedures. Although addressed in a general way, no specific reference was made back to the three questions posed earlier in the paper regarding the way agricultural education would respond to the increased diversification of the program.

Questions

How was the questionnaire developed? Was the questionnaire adopted or adapted from a former study or was it created specifically for the current study? Were any other instruments identified in the literature search? Have other studies been conducted of agricultural education graduates? What were the author's conclusions regarding the diversity of program questions raised in the introduction section of the paper?

Commendations

The major strength of the study was the author's willingness to conduct a self-assessment on the ongoing program to find out its strengths and weakness. The study provided a design and format that other agricultural education programs can use to obtain feedback on curriculum, teaching, advising, and follow-up support of students after graduation. The study also shows that data collected for self-assessment purposes can produce results useful for program revision and improvement.

Clinical Experiences For Agricultural Teacher Education Programs in North Carolina, South Carolina and Virginia

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Abstract

The purpose of this study was to build a task list for the clinical experience program for the agricultural teacher education programs in North Carolina, South Carolina, and Virginia. The objectives were: (1) compile a list of clinical experiences, both early field and student teaching, that currently are provided in the clinical experiences for students of agricultural education in three-selected teacher education programs, and (2) use an expert panel to determine what should be included in early field experiences and student teaching experiences for students enrolled in the agricultural teacher education program.

A modified Delphi technique was used to collect data via three questionnaires. Data were analyzed using mean scores and standard deviations of tasks rated on a five point Likert-type scale. Those tasks that the panelists rated with a standard deviation of less than or equal to one were considered to have met consensus.

The population for this study consisted of agriculture teachers, secondary school administrators, agricultural education field staff, and agricultural education teacher educators from North Carolina, South Carolina, and Virginia. Thirty-four Delphi panel members were purposively selected from the population. Thirty-one panel members responded to Round I, 33 panel members responded to Round II, and 29 responded to Round III yielding an overall response rate of 92%.

Rounds I, II, and III resulted in 102 tasks for early field and student teaching experiences that met consensus. Based on the findings, the researcher developed a task list for early field experiences and student teaching experiences to be considered for use by the agricultural education programs in the three cooperating states.

Introduction /Theoretical Framework

Change is constant, inevitable, often uncomfortable, and usually problematic in areas such as education. Agricultural education is not immune from change or the problems associated with change. Herring and Norris (1987) contended that if agricultural education did not change its methods of teaching, it would die. Long before the Herring and Norris article, the Vocational Education Act of 1963 recognized the changing face of agriculture by expanding the definition of vocational agriculture to include the preparation of students for any occupation involving knowledge and skills in agricultural subjects.

The Committee on Agricultural Education in Secondary Schools Board on Agriculture of the National Research Council issued a report in 1988 titled, *Understanding Agriculture—New Directions for Education*. This report called for major reform in agricultural education and also in teacher education programs. This report recommended the following:

> Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers and other professional personnel to staff, administer and supervise educational programs in and about agriculture.
>
> Colleges of agriculture, particularly in land-grant universities should become more involved in teacher preparation and inservice education programs, curriculum reform, and development of instructional materials and media. (p. 7)

The report found that agricultural literacy programs were not available for those preparing to teach, other than for individuals entering vocational education careers.

Agricultural education programs in the public schools are dependent on agricultural teacher education programs (McGhee & Cheek, 1989) because they produce the teachers for the programs. Teacher education programs must be flexible and ensure that they provide the experiences that are needed to prepare the future teachers for our changing society.

According to McLean and Camp (1998), agricultural teacher educators have experienced pressure over the past 15 years to reform the process of preparing agricultural teachers. They further stated that there is a void of current data on curricular content or structure in agricultural teacher education programs. Camp and Bailey (1999) stated, "We can see that there is a long-standing and broad advocacy for and acceptance of field-based student teaching apprenticeship as of a paramount importance in agricultural teacher education.

Background

The focus of this study was early field experiences and student teaching experiences and how these two clinical experiences should be designed in order to meet the needs of today's contemporary agricultural education student. This study used behavioral learning theory, in particularly mastery learning, as its theoretical framework.

According to Fosnot (1996), behaviorism regards psychology as a scientific study of behavior and explains learning as a system of behavioral responses to physical stimuli. Schwartz (1978) noted that Rene' Descartes (1596-1650) divided behavior into two classes, voluntary and involuntary. Voluntary behavior was governed by reason of the mind, and involuntary behavior was purely mechanical.

Fosnot (1996) outlined one aspect of behaviorism at it applies to instruction as "educators using the behavioral framework preplanned into assumed component parts – 'skills' – and then sequencing these parts into a hierarchy ranging from simple to more complex" (p. 9). Bloom (1956) and Gagne (1965) stated that observations, listening to explanations from teachers who communicate clearly or engaging in experiences, activities or practice sessions with feedback will result in learning and that proficient skills will quantify to produce the whole, or more encompassing concept. The classical behaviorism model is Bloom's mastery learning model. This mode breaks wholes into parts, and skills are broken into subskills. Bloom's model indicated that if "needs" are met, then one could teach until mastery is reached (Fosnot, 1996).

Behaviorist theory has persisted for many years and has been shown to have validity under many educational conditions (Gagne & Driscoll, 1988). According to number seven of Prosser's "Sixteen Theorems," vocational education will be effective in proportion as the instructor has had successful experiences in the application of skills and knowledge to the operations and processes he undertakes to teach (Camp & Crunkilton, 1984). Vocational education uses behaviorist theory as the cornerstone of practices used to teach students. For the most part, vocational students are taught one task at a time. Each task will be a building block for the next task that follows. Through several steps, this study is designed to generate a list of task that specify clinical experiences needed by the students of agricultural education.

Purpose and Objectives

The purpose of this study was to build a task list for the clinical experience program, both early field and student teaching, for the agriculture teacher education programs in North Carolina, South Carolina, and Virginia.

The following specific objectives were established to guide the study in conducting this research:

1. Compile a list of clinical experiences, both early field and student teaching, that currently are provided in the clinical experiences for students of agricultural education in three selected teacher education programs.
2. Use an expert panel to determine what should be included in early field experiences and student teaching experiences for students enrolled in the agricultural education program.

Methods/ Procedures

A modified Delphi technique was used to generate a task list for clinical experiences, including both early field experience and student teaching experience. As a result of the panel members' variations in their familiarity with education methodologies and accompanying terminology, a modified Delphi approach was used to refine and narrow the data after the initial list of tasks was developed by the three cooperating agricultural education programs at land-grant universities. The initial task list was developed by using the three cooperating agricultural education program's existing requirements for clinical experiences. The researcher editorially combined similar tasks. To ensure the intent of the combined task were not altered the researcher formed a jury with one agricultural educator from each of the cooperating programs to ensure content validity and guard against researcher bias. Data were collected by three mailed questionnaires over a five-month period in 1999.

The population for this study consisted of 8 agricultural teacher educators, 9 agricultural education field staff, 790 agriculture teachers, and 278 secondary school administrators from North Carolina, South Carolina, and Virginia. The researcher selected these three states because they were already working together as a consortium on reinventing agricultural education for the year 2020. The researcher asked three teacher educators, one from each of the cooperating land-grant universities, to nominate experts from each of the categories from their state. Thirty-six experts were nominated and 34 agreed to serve on the panel.

In Round I, the panel of experts responded to the first questionnaire that contained the original list of tasks developed from the three cooperating agriculture teacher education programs at the land-grant universities. This questionnaire included:

1. 36 tasks for early field experiences (EFE),
2. a space for additional comments for EFE,

3. 62 tasks for student teaching experiences (STE),
4. a space for additional comments for STE and
5. questions to identify background information about the panel members.

In Round II, the researcher incorporated commentary for those tasks that did not meet consensus from Round I, the panel of experts responded to the revised task list. The questionnaire included:

1. 16 total tasks for early field experiences, for 9 of the items panel members were also asked to select from among 3 options: move to STE, leave in EFE, or do away with this tasks;
2. 6 new tasks for EFE developed from Round I;
3. 17 tasks in STE; and
4. 8 new tasks for STE developed from Round I,
5. a space for additional comments.

In Round III the panel of experts responded to a task list made up of tasks that did not meet consensus in Round II. The questionnaire contained 1) 12 tasks for EFE and STE, and 2) the option to vote to remove, or keep each task.

Data collected from the three questionnaires were analyzed using standard deviation and mean scores. The tasks were rated using a five point, Likert-type scale: 1 = strongly agree, 2 = disagree, 3 = not sure, 4 = agree and 5 = strongly agree. Consensus was met for this study if the standard deviation was equal to or less than one.

Summary and Discussion of Findings

Summary for Early Field Experiences

Of the 36 tasks listed in Round I, 20 tasks met consensus (see Table 1). As indicated by Shinn (1998), Round I in the modified Delphi technique will produce the greatest number of consensus items on important issues. Round I produced 422 additional comments. These comments were used to enhance the tasks that did not meet consensus in Round I.

Three themes arose from the comments in Round I. They were time, planning, and cooperation. Two groups, the agriculture teachers and secondary school administrators, seemed to echo these themes. However, these two groups felt 40 hours was too much time spent while teacher educators felt that 40 hours was the correct amount of time for the EFE experience. The commentary indicated that planning and cooperation were two practices that could not be separated. All four groups felt that planning and cooperation were vital and that they should occur before EFE.

In Round II, the panel members were asked to rate 16 tasks, seven met consensus. According to Hostrop (1975) and Linstone and Turoff (1975), the data should converge toward the majority opinion on Round II more so than any other round. The general consensus among comments received back from Round II was "all the EFE tasks are very important, however does the student have the time to complete all these tasks?"

Also, in Round II, the experts were given the opportunity to vote on nine EFE tasks. The experts could vote to, move the task to STE, leave the task in EFE, or delete the task.

Round III, produced three EFE tasks, which met consensus (Table 1).

Summary for Student Teaching Experiences

Of the 62 tasks listed in Round I, 44 tasks met consensus (see Table 2). As indicated by Shinn (1998), Round I in the modified Delphi technique can be expected to produce the greatest number of consensus items on important issues. Round I produced 545 additional comments. These comments were used to enhance the tasks that did not meet consensus in Round I.

Three themes arose from the comments. They were time, planning, and cooperation. Two groups, the agriculture teachers and secondary school administrators, seemed to echo these themes. During STE, the agriculture teachers and school administrators felt that the majority of time should be on "classroom teaching." Teacher educators and field staff felt a mixture of teaching, FFA, and community activities should occur during the STE.

The commentary indicated that planning and cooperation were two practices that could not be separated. All four groups felt that planning and cooperation were vital and that they should occur before STE. One example used was that STE should be a contractual agreement between the student, agriculture teacher, teacher educator, and school administrator.

During Round II, 17 of the revised STE tasks were rated, 13 STE tasks met consensus. Of the eight new tasks recommended by the panel members seven met consensus. According to Hostrop (1975) and Linstone and Turoff (1975), the data should converge toward the majority opinion on Round II more so than any other round. The general consensus among comments received back from Round II was "all the tasks are very important, however does the student have the time to complete all these tasks?" Another area of concern that came out of Round II was the adult education program and young farmer program. North Carolina does not have either of these programs and Virginia middle school agriculture teachers do not have these programs. Respondents from these two groups rated tasks associated with adult education and/or young farmers as a low priority.

Round III provided three additional tasks for STE, (Table 2).

To summarize the findings, According to Hostrop (1975) and Linstone and Turoff (1975), little additional movement toward consensus occurs after this round. With regard to panel movement toward consensus on the tasks, the greatest movement occurred between Round I and Round II. This phenomenon is similar to that reported by other Delphi studies (Hostrop, 1975). Minimal additional movement toward consensus was obtained between Round II and Round III as anticipated. According to Sutphin (1981) other studies have shown that after three round of the Delphi little to no movement toward consensus will be gained. A fourth round was not deemed necessary since minimal shift in panel perception was reported between rounds two and three. Of the tasks rated in Rounds I, II, and III, 111 of these tasks met consensus and were included on the task list.

It was evident, from the commentary that the Delphi panel struggled with the tasks they believed to be out of sequence, e.g. tasks listed in EFE that some members believed should be included in STE. According to one panel member, "you are getting the cart before the horse." Another replied with, "the student must crawl before he/she walks." The order of tasks became increasingly important to the panel members as the process progressed. One agriculture teacher suggested in his Round III comments that another study should be done to place the tasks in order of importance and to sequence them from easy to difficult. The comments made during this study indicated that the tasks should be sequenced using the behavioral framework.

Table 1. Tasks That Met Consensus For Early Field Experience

Mean	Stan Dev	Round	Statement The student will:
4.84	0.37	I	review the course of study and teaching calendar of cooperating teacher.
4.71	0.64	I	observe high school agriculture classes during instruction.
4.58	0.56	I	observe assigned teachers style of teaching.
4.55	0.68	I	jointly plan EFE with local agriculture teacher and university professor, prior to EFE.
4.55	0.51	I	become familiar with type(s) of program(s) in the assigned school.
4.45	0.57	I	learn grading system of assigned school.
4.39	0.84	I	identify the characteristics of good teaching and of competencies required of agricultural education instructors in a world of changing agricultural technology before starting EFE.
4.39	0.70	II	work with the university professor, local agriculture teacher and school administration on developing a written plan for EFE
4.35	0.95	I	conduct/observe assigned FFA meetings.
4.33	0.61	I	fill out relevant university forms.
4.32	0.75	I	identify principles and teaching strategies involved in developing and conducting agricultural education programs including integration of basic skills and academics before EFE.
4.27	0.67	II	perform tasks assigned by the agriculture teacher in relation to a plan developed by university professor, local agriculture teacher and school administrator.
4.23	0.99	I	become familiar with agriculture teacher's role in public relations.
4.21	0.74	II	visit the designated school one time before EFE to meet with school officials and assigned cooperating teacher to get a feel for the school environment.
4.19	0.95	I	develop an understanding of the philosophy, goals, importance and relationship of agricultural education curricula within the local school.
4.17	0.87	II	observe different teaching and learning styles.
4.10	0.70	I	give a report on activities conducted by secondary agricultural education teachers in assigned school.
4.06	0.96	I	observe middle school agriculture classes during instruction.
4.06	1.00	I	visit key people in the community and become familiar with the community.

Table 1. Tasks That Met Consensus For Early Field Experience

Mean	**Stan Dev**	**Round**	**Statement**
			The student will:
4.03	0.84	I	observe academic classes during instruction.
4.03	0.84	I	plan, develop, and teach a micro-lesson to secondary or middle school agriculture students incorporating motivational strategies.
4.03	0.68	II	identify motivation techniques used by teachers.
3.94	1.00	I	promote a sensitivity for the needs of special populations and multicultural education; being sensitive to the educational needs of a rural population during EFE.
3.91	0.78	II	will develop a time schedule that meets the local agriculture teacher's approval on how and when the EFE is to be done.
3.81	0.87	I	complete and document a minimum of 40 clock hours of EFE.
3.78	0.83	II	Meet/interview vocational administrator, guidance counselors and department advisory committee.
3.77	0.91	III	Learn the components of a complete agricultural education middle and secondary school curriculum, including scope, sequence and accountability measures.
3.73	0.78	III	provide individualized instruction to students while supervising agricultural experience programs conducted by students.
3.71	0.90	I	observe non-ag vocational classes during instruction.
3.71	0.76	II	work with the local agriculture teacher on his/her grading system in relationship to homework/tests and grade several exercises.
3.64	0.90	II	become familiar with adult education program.
3.52	0.91	III	monitor class during testing.
3.50	0.92	II	discuss with the local agriculture teachers, how the local agriculture programs meet State Department of Education requirements.
3.48	0.97	II	become familiar with professional development activities available during the summer months.
3.38	0.96	II	give a written critique of the local agriculture program as the final part of EFE.
3.07	0.87	II	attend a local school board meeting.

Table 2. Tasks That Met Consensus For Student Teaching Experience

Mean	Stan Dev	Round	Statement The student will:
4.87	0.34	I	for at least part of the internship, have a full teaching load and perform all of the associated duties of a teacher
4.84	0.58	I	plan, in conjunction with the cooperating teacher, a teaching calendar for the time period of the STE.
4.84	0.37	I	keep accurate records and prepare appropriate reports as requested by the cooperating teacher, cooperating school district, and/or Agricultural Education Department.
4.84	0.37	I	plan and deliver effective instruction about agriculture to secondary or middle school students.
4.84	0.37	I	attend school faculty meeting in the assigned school.
4.81	0.40	I	jointly plan the STE with the cooperating teacher and university supervisor.
4.74	0.44	I	develop and use instructional aides to match the learning environment and learning needs of individuals and groups.
4.65	0.55	I	supervise student agricultural experience programs (SAE).
4.58	0.56	I	become familiar with the policies and procedures of the assigned local school's agricultural education department documented by the completion of specified activities and reports required by the Agricultural Education Department.
4.58	0.72	I	perform non-instructional duties that may be assigned to the cooperating teacher(s).
4.58	0.62	I	attend an area or district Agricultural Education meeting.
4.55	0.62	I	self-evaluate their performance as a teacher using an approved form issued by the agricultural education program.
4.55	0.62	I	coach a team or an individual for a career development event (CDE).
4.55	0.57	I	meet professional agriculture personnel in community.
4.53	0.78	I	advise local FFA Chapter or an approved youth leadership organization to include the plan of activities, meetings, activities, and achievement recognition as documented by the completion of specific activities and reports.
4.52	0.51	I	Examine an Individualized Instruction Plan (IEP) and discuss with a special needs teacher.

Table 2. Tasks That Met Consensus For Student Teaching Experience

Mean	**Stan Dev**	**Round**	**Statement** **The student will:**
4.48	0.63	I	interview one guidance counselor – discuss Agricultural Education and guidance programs.
4.45	0.85	I	demonstrate effective communications with students, peer teacher, parents, and community leaders substantiated by the completion of specific written documents and reports.
4.45	0.81	I	recruit students for agriculture classes.
4.42	0.62	I	participate in a post-internship seminar designed primarily to promote continued professional growth through reflective practice. (university)
4.42	0.62	I	observe the teaching techniques of the cooperating teacher in both secondary and adult instruction and complete a teaching observation report for each observation.
4.42	0.67	I	attend the agriculture advisory council meeting for their assigned program.
4.41	0.50	II	plan, present, evaluate and demonstrate teaching practices that are generally carried out in a laboratory setting.
4.38	0.62	I	demonstrate positive public relations through planned publicity for the assigned agriculture program and students. Public relations should not be limited to youth leadership recognition. Documentation should include media releases, photographs, and work samples.
4.35	0.55	I	develop and demonstrate a reflective approach to professional practice during STE.
4.35	0.75	I	maintain a daily and weekly journal of reflective exercises during STE.
4.35	0.88	I	supervise the completion of one award application for FFA or approved youth group.
4.34	0.60	II	use new computer/agric tech in classroom instruction.
4.32	0.87	I	clock a minimum of 150 hours of supervised classroom and laboratory teaching experience during the student teaching experience.
4.32	0.70	I	plan a series of related learning experiences designed to strengthen their professional and technical background during STE. As one component of this series of learning activities, you will observe a variety of teachers and teaching settings and analyze them as they provide implications for their own teaching and professional development.

Table 2. Tasks That Met Consensus For Student Teaching Experience

Mean	Stan Dev	Round	Statement The student will:
4.29	0.64	I	grade student SAE record book.
4.26	0.86	I	plan and conduct activities with a non-vocational teacher designed to integrate core courses and agricultural education.
4.26	0.82	I	plan FFA week activities.
4.26	0.96	I	read professional journals
4.25	0.62	II	have a meaningful experience planning classroom instruction that will culminate with a laboratory activity.
4.23	0.76	I	demonstrate an acquaintance with the school and community as documented by the completion of specific activities and reports as required by university and secondary or middle school.
4.19	0.78	II	develop and teach integrated lesson with academic (core subject matter) teacher.
4.19	0.63	III	encourage and expose student teacher to the professional organizations that has ties with agricultural education.
4.13	0.86	I	plan, manage and evaluate school and community services such as the greenhouse, land laboratory or other community resources as documented by the completion of specific activities and reports.
4.13	0.66	II	develop classroom management experiences/options.
4.06	0.77	I	review the permanent records of five students in their agriculture classes.
4.06	0.66	II	develop a teaching calendar based on the needs of the agriculture program at the local high school.
4.03	0.77	II	visit farmers and agribusinesses in the local area.
4.03	0.92	II	after completion of a successful student teaching experience, write a newspaper article in regards to the assigned agriculture program.
4.00	0.82	I	demonstrate special methods and techniques for adult learners in both group and individual instruction.
3.97	0.95	I	evaluate the local Agricultural Education Department.
3.97	0.87	I	complete one State Department of Education form in relation to agricultural education.
3.94	0.85	I	observe and evaluate an adult class being taught using an approved evaluation form by agricultural education.
3.91	0.89	II	conduct an examination of how the Agricultural Education Program serves the school/community.
3.88	0.78	III	observe a class in another department in assigned

Table 2. Tasks That Met Consensus For Student Teaching Experience

Mean	Stan Dev	Round	Statement **The student will:**
			school.
3.85	0.62	II	interview student/teacher about a cooperative work experience contract if appropriate.
3.84	0.82	I	conduct in-depth case studies of students, including students identified as having special needs.
3.83	0.99	I	assist the cooperating teacher(s) in planning an adult course of study.
3.82	0.95	II	assist the local agriculture teacher in conducting adult education class if appropriate for school in which student teaching experience is being conducted.
3.78	0.91	II	interview the local vocational director to determine procedures of personnel, financial and facilities management.
3.74	0.96	I	compare and contrast the development of adolescents and adults, and identify effective instructional strategies to meet individual and group learning needs.
3.74	0.73	I	tutor a special needs student.
3.74	0.95	II	conduct a mock interview with appropriate school officials.
3.69	0.79	III	attend/observe the young farmer chapter meeting if appropriate.
3.62	0.98	I	conduct a case study on a secondary or middle school agricultural student.
3.58	0.97	II	meet local media representatives or district communication department staff who can assist in public relations.
3.58	0.87	II	attend local civic activities in the assigned location.
3.52	0.97	II	live in the community while student teaching if appropriate and housing is available.
3.36	0.90	II	interview a social case worker in relation to classroom activities for special needs students if appropriate.
3.34	0.90	II	develop a list of addresses of magazine subscriptions and catalogs used at the school so the student teacher can use them as a resource when they become teachers.
3.15	0.91	II	conduct an agriculture/agribusiness case study.

Conclusions

Based on the findings of this study, EFE and STE are essential components of the preservice program. The overall response rate of 92% indicated the importance of this study to the panel of experts. A comprehensive task list was compiled during the three rounds of the

Delphi. The Delphi technique proved to be an excellent research technique for this type of study.

The task list developed during this study is comprehensive. This list should be flexible to meet the needs of the students and the agricultural programs involved in the implementation of the tasks. The task list will be beneficial for the planning, implementation, and evaluation of both types of clinical experiences. The primary concern echoed by all four groups during this process was the student's time. In order for the student to meet the demands of the tasks for early field and student teaching, they must have a detailed program of work. This program of work must have input from the student, agriculture teacher, teacher educator, and secondary school administrators.

The task list can help university faculty members determine preservice course requirements for students enrolled in agriculture teacher education programs. In order for the student to accomplish the tasks during their clinical experiences, they must have an understanding of the following areas: curriculum development, learning styles, technical areas, teaching methods, teaching techniques, and academic integration methods.

Since the Delphi technique was employed, slightly unequal balance between groups gave no individual or group an advantage in the decision and discussion process (Dybas, 1980). Each panel member discussed and provided feedback on the tasks that they supported strongly and/or disagreed with strongly. The process took time to collect, revise, interpret data, and provided feedback to the panel. The task list developed by this process has the potential to enhance the requirements for clinical experiences required by the three cooperating departments of Agricultural Education.

Recommendations

The recommendations listed in this section are based upon findings of this study and impressions gained by the researcher while conducting the study.

1. Agricultural teacher educators should consider developing a general model for the clinical experience components of the agricultural education program in the three-state area, while maintaining appropriate flexibility for local program adaptations. Teacher educators in each state involved in the study should take the findings of this study and consider formulating tasks that specifically address issues important to the future of agricultural education in the respective state.
2. Agricultural educators should do future research on the task list compiled during this study. The commentary from the study suggested that additional research be conducted on the task list to establish the ranking of importance.
3. Replication of this study should be conducted on a national level.
4. The agricultural education profession should develop specific efforts to continually study, discuss, and identify issues of importance in relationship to preservice curriculum and specifically clinical experiences.

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Clinical Experiences For Agricultural Teacher Education Programs in North Carolina, South Carolina and Virginia

A Critique

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Dobbins and Camp identified an area of concern to teacher educators in agriculture, that of what tasks should be incorporated into pre-service clinical experiences. The authors identified a need for changes in how teachers are prepared, but could have provided more rationale. The Introduction and Background sections of the paper did not make a case as to why this study was important, and what it contributes to participating programs.

My initial reaction to the use of behaviorism as the theoretical framework for the study was concern; however, in examining the purpose of this study, it is appropriate. The authors could have enhanced the presentation of the theoretical framework by showing how it fit the objectives of the study. I would suggest that we need to re-examine the purpose of the clinical experience and how reflective models (Dewey, Mezirow) can be adapted to agriculture, given our movement to more science-based instruction.

The Methods selected to conduct this study seem appropriate, but they are not clearly outlined and are difficult to follow. It would have been helpful to describe events in chronology, particularly the development of the initial tasks lists as preliminary to the data collection, and the determination of consensus. I was not certain how comments were utilized to change non-consensus items for the next round. Also, there is an error in reporting the Likert scale, but I assumed meaning from the context.

The results are presented in a fairly straight-forward manner and it is unlikely that the authors could have avoided the use of lengthy tables. Results are easy to read, and the materials flow well. This section would have been enhanced with more in-depth discussion of the results in the context of the theoretical framework and literature related to changes in teacher education. As written, it was not easy to make linkages between the data and the front sections of the paper. Also relating the results of the study to RAE 2020 consortium activities would have provided insight into some of the vision the three states have for teacher education.

Recognizing that I might be pushing beyond the intentions of the study, I would ask the authors to consider the following questions, which have implications for how the results are utilized:

- The task lists are extensive and complete, and behaviorally sound. Activities and observations ensure a solid clinical experience. What is in place to ensure reflection on activities, their broad meanings, and how the "learnings" transfer to a new situation?
- Is there room for a more constructivist approach to the preservice clinical experiences?

All in all, I commend the authors for providing us with a useful tool when considering the design of preservice clinical experiences.

Cooperating Teachers' Perceptions of Important Elements of the Student Teaching Experience: A Focus Group Approach with Quantitative Follow-up

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It has been argued that the most important component of preservice development for agriculture teachers is the student teaching experience. For example, relationships between cooperating teachers' attitudes toward teaching and those of their student teachers have been identified. Moreover, many believe that an efficacious student teaching center provides "safety" as well as "challenge," and that the quality of supervisory "climate" is critical for success.

To this end, two purposes of this study were to describe selected characteristics of cooperating teachers and their schools, and to identify teachers' perceptions about the important elements of the student teaching experience. Historically, researchers have "quantified" these elements. However, others have posited that to better understand a complex phenomenon such as student teaching, a "soft systems" approach may be more effective. This design could involve the use of focus groups. So, another purpose was to compare teachers' perceptions when determined by focus groups and by a mail questionnaire.

Five focus groups were used to determine teachers' perceptions. The groups included 35 teachers representing 23 schools; each group represented a "core" component (area) of the student teaching experience. Teachers identified 34 elements as being "important." These elements (items) were included in a questionnaire administered during the study's second phase. Items addressed "core" areas of the student teaching experience—classroom and laboratory instruction, supervised agricultural experience programs, student leadership development, school and community relationships, and cooperating teacher-student teacher relationships; included were 11 multiple-choice questions describing selected characteristics of the teachers and centers. Participants rated the elements using a Likert-type rating scale ("5" = "High Importance,"… "1" = "No Importance"). Cronbach's reliability estimates for the core areas ranged from .49 to .86, and .91 for the overall scale. The final rate of return was 89% and 91% for teachers and centers, respectively.

All items were perceived to have either "much" or "high importance" ($\underline{M} \geq 4.00$); the overall mean was 4.54. Two core areas tied for highest composite mean (4.69)—"Classroom and Laboratory Instruction" and "Cooperating Teacher-Student Teacher Relationships." The highest rated element was "a well rounded program emphasizing instruction, SAEs, and youth leadership activities" ($\underline{M} = 5.00$). Four of the five lowest rated elements belonged to the core area "School and Community Relationships."

The focus groups' perceptions were confirmed by the teachers' ratings of importance via a mail questionnaire. This finding supports the assertion that a "soft systems" approach can be an appropriate research procedure when examining a complex phenomenon, and further that it may be beneficial to apply "methodological mixes" to a research design when deemed feasible.

Introduction and Theoretical Framework

Is there a more important component of the preservice professional development of aspiring agriculture teachers than the student teaching experience? Schumann (1969) argued, "The experiences obtained during student teaching are probably the most crucial activities involved in the development of prospective vocational agriculture teachers" (p. 156). Schumacher and Johnson (1990) stated that "the influence of the cooperating teacher on the preparation of new teachers is profound" (p. 2). Moreover, Norris, Larke, and Briers (1990) asserted, "the student teaching center and the supervising (cooperating) teacher are the most important ingredients in the student teaching experience" (p. 58). Other researchers (Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Garton & Cano, 1994; Martin & Yoder, 1985) have supported this premise.

DeMoulin (Hoyle & Estes, 1993) posited that "Ideally, students should exhibit positive changes in attitude toward teaching and come away from the student-teaching experience with a positive attitude toward their chosen profession" (p. 160). Deeds and Barrick (1986) examined attitudes of preservice teachers toward themselves as future teachers and toward teaching agriculture, following early field-based experiences. They concluded that the perceptions of preservice teachers regarding the quality of program in which their early field-based experience transpired were related to the extent that their attitude was positive. Further, Byler and Byler (1984) analyzed student teacher morale before and after the student teaching experience and concluded, "there was a significant relationship after the student teaching experience between student teachers' morale and the morale of their cooperating teachers" (p. 27).

Martin and Yoder (1985) conceptualized a successful student teaching experience as one in which a "team approach" (p. 19) defined the relationship between the cooperating teacher and the student teacher. This approach envisioned a supervisory "climate" devoted to using a clinical teaching analysis model. These researchers contended that "the success of the supervision and the success of the individual student teacher depends, to a very great extent, upon the general supervisory climate in the department and on the educational leadership abilities of the cooperating teacher" (p. 21). Moreover, Korthagen and Kessels (1999) argued that a cooperating student teacher center "must be able to offer a sound balance between safety and challenge and a balance between the goal of serving the student teachers' learning and the interests of the school" (p. 14). Further, DeMoulin (Hoyle & Estes, 1993) contended, "The supervisory instructor is present to foster unique teaching concepts and to give support and encouragement to preservice teachers" (p. 160). In support, Garton and Cano (1994) maintained, "Priority should be given to selecting cooperating teachers who model the desired teaching behaviors expected of student teachers" (p. 213). As Martin and Yoder (1985) stated, "Supervision of student teachers represents an important responsibility" (p. 21). It is a responsibility that has and continues to demand a diligent research interest on the part of the profession.

Investigators (Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Larke, Norris, & Briers, 1992) have identified and quantified important dimensions of the student teaching experience through the use of survey research methods (i.e., mail questionnaires). For example, Deeds (1993) collected data from 82 institutions, nationally, that were charged with agricultural teacher education. Further, Larke, Norris, and Briers (1992) conducted a national study that queried three groups—teacher educators, supervising teachers, and student teachers. Consistent with traditional quantitative research methodology, these studies sought to "generalize" the essential components of a frequently complex phenomenon—the student teaching experience. Yet, is a post-positivistic approach a valid method for describing the important elements of this experience?

Miller (1998) stated that "Our [agricultural and extension education] tradition and our learning related to research methods are couched in the empirical method. However, much of our interest for knowledge production or problem solving lies in practical understanding with our basis in communicative interaction or emancipation" (n. p.#). Moreover, Miller (1998) argued that the very "nature" of social science research, that is, its tendency for being highly contextual and problem-centered, seriously hampers even the most rigorous attempts to generalize the results. As an appropriate alternative, Miller suggested a "soft systems methodology [SSM]" as "a philosophical basis for conducting inquiry," one that "deals with problem setting, and involves stakeholders in the research process in the local context" (n. p.#). An application of this premise could be a focus group research design. Focus groups, by definition, hinge on the principle of "communicative interaction" and the direct participation of stakeholders (Krueger, 1994; Morgan, 1997; Stewart & Shamdasani, 1990).

A review of literature revealed no research using cooperating (supervising) agriculture teachers as a "focus group" to collect information about their perceptions of important elements of the student teaching experience. However, researchers (Cole & Waters, 1997; Gamon & Chestnut, 1994; Haak & Talbert, 1998) have used focus groups when investigating other questions in agricultural education. Moreover, Stewart and Shamdasani (1990) concluded that "among the most widely used research tools in the social sciences are group depth interviews, or focus groups" (p. 9). In support, Popham (1993) stated, "…behavioral scientists have been increasingly drawn to the virtues of *focus group interviews* as a method of securing useful qualitative data" (p. 194). Morgan (1997) defined a focus group "as a research technique that collects data through group interaction on a topic determined by the researcher" (p. 6). Stewart and Shamdasani (1990) opined that a "contemporary focus group interview generally involves 8 to 12 individuals who discuss a particular topic under the direction of a moderator who promotes interaction and assures that the discussion remains on the topic of interest," and that it "will last from one and a half to two and a half hours" (p. 10).

This form of qualitative research methodology is recognized for its ability to yield "emic" data, that is, "data that arise in a natural or indigenous form" (Stewart & Shamdasani, 1990, p. 13). Focus group participants "respond in their own words, using their own categorizations and perceived associations" (p. 13). For these and other reasons focus groups can be useful research tools for generating hypotheses, for better understanding the participants' "vocabulary" regarding the question(s) under study, for refining questionnaire terminology and scaling, and for increasing the researcher's understanding of previously collected quantitative data (Krueger, 1994; Morgan, 1997; Popham, 1993).

A fundamental characteristic of focus groups is that they create a forum for "group" interaction and collective expression; yet, this is viewed as having both positive and negative consequences. For example, Stewart and Shamdasani (1990) stated, "This synergistic effect of the group setting may result in the production of data or ideas that might not be uncovered in individual interviews" (p. 16). However, "the responses from members of the group are not independent of one another, which restricts the generalizability of results;" and that, "the results obtained in a focus group may be biased by a very dominant or opinionated member" (p. 17).

Popham (1993) echoed these reservations yet maintained "qualitative methods such as focus group interviews will usually yield certain insights and understandings that are simply not obtainable through quantitative methods alone" (p. 204), and that focus groups are a useful source of data that "can be used in concert with quantitatively oriented procedures" (p. 203).

Moreover, Krueger (1994) stated, "Increasingly, researchers are recognizing the benefits of combining qualitative and quantitative procedures, resulting in greater methodological mixes that strengthen the research design" (p. 29). Related to this premise, Gall, Borg, and Gall (1996) asserted that the process of "triangulation helps to eliminate biases that might result from relying exclusively on any one data-collection method, source, analyst, or theory" (p. 574). Further, they suggested that it is possible to achieve triangulation by following "the process of using multiple data-collection methods, data sources, analysts, or theories to check the validity of case study findings" (p. 574). To this end, Krueger (1994) asserted, "focus groups can precede quantitative procedures;" and that the "insights [gained] can then be used to develop more efficient follow-up quantitative procedures such as telephone or mail-out surveys" (p. 29). Further, Stewart and Shamdasani (1990) maintained, "Focus groups also have a place as a confirmatory method that may be used for testing hypotheses" (p. 15).

Yet, will cooperating teachers' perceptions of important elements of the student teaching experience be similar (i.e., confirmatory) or different, depending on whether their perceptions are determined by a focus group or alternately by a mail questionnaire?

Purposes and Research Questions

Two purposes of this study were to describe selected characteristics of cooperating teachers and their schools, and to identify what cooperating teachers perceive to be the important elements of the student teaching experience. An additional purpose was to conduct a form of triangulation (Gall et al., 1996) and compare cooperating teachers' perceptions of important elements of the student teaching experience, when determined by both qualitative and quantitative research methods. Specific research questions guiding this study were: 1) What are selected personal, professional, and school setting characteristics of cooperating teachers? 2) What do cooperating teachers perceive to be important elements of the student teaching experience as determined by focus groups? 3) What do cooperating teachers perceive to be important elements of the student teaching experience as determined by a mail questionnaire? 4) Are cooperating teachers' perceptions of the important elements of the student teaching experience as identified by focus groups similar to those elements perceived to be important as determined by a mail questionnaire?

Methods and Procedures

This was a descriptive study that used both qualitative (focus groups) and quantitative (mail questionnaire) research procedures to describe selected characteristics of cooperating teachers and their schools, and to identify cooperating teachers' perceptions of the important elements of the student teaching experience. The Department of Agricultural Education at Texas A&M University hosted an agriculture cooperating teacher workshop on July 6-7, 1998. A portion of the workshop included a focus group exercise to determine participants' perceptions of the "important elements" of the student teaching experience. The study's focus groups were comprised of the teachers in attendance. The groups' members included teachers (n = 35) and schools (n = 23) that had either served as cooperating student teaching centers during the previous three years or were future placement sites.

Prior to the workshop, the teachers were divided into five different focus groups of seven members each. Members of the same department were assigned to different groups (Popham, 1993). Each of the five focus groups represented a "core" component (area) of the student teaching experience as identified by a review of literature (Claycomb & Petty, 1983; Edwards & Briers, 1998; Garton & Chung, 1995; Larke, Norris, & Briers, 1992; Martin & Yoder, 1985; Miller & Scheid, 1984) and by teacher education faculty in the Department of Agricultural Education at Texas A&M University. The five core areas were: classroom and laboratory instruction, supervised agricultural experience programs (SAEPs), student leadership development (FFA), school and community relationships, and cooperating teacher-student teacher relationships.

Teachers were notified by mail of their group's core area and were asked to devote their "best thinking" to that component of the student teaching experience. During the workshop, approximately one and a half hours was used for the purpose of focus group breakout sessions. The participants were provided flip chart sheets and pens, and were instructed to record the important elements that emerged during the session. During the "group" time, a teacher educator monitored the discussions, served as a "moderator," and provided structure when necessary (Morgan, 1997; Stewart & Shamdasani, 1990). In turn, each focus group reported the "important elements" of the student teaching experience that they had identified.

The teachers identified 34 elements of the student teaching experience as being "important." These elements (items) were included in a mail questionnaire administered during the second phase of the study (Morgan, 1997; Stewart & Shamdasani, 1990). Part one of the survey instrument consisted of 11 multiple-choice questions describing selected personal, professional, and school setting characteristics of the cooperating teachers. The second part of the questionnaire was divided into five "core" areas of the student teaching experience and included the 34 "important elements" identified earlier by the cooperating teacher focus groups: classroom and laboratory instruction (5 items), supervised agricultural experience programs (SAEPs) (4 items), student leadership development (FFA) (7 items), school and community relationships (9 items), and cooperating teacher-student teacher relationships (9 items). The survey participants were asked to rate the "level of importance" of the elements using a Likert-type rating scale ("5" = "High Importance," "4" = "Much Importance," "3" = "Some Importance," "2" = "Low Importance," and "1" = "No Importance"). Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .49 to .86, with the overall importance scale of 34 items yielding a .91.

Following the workshop, participants were mailed a research packet that included a cover letter explaining the second phase of the study, a survey questionnaire, a pre-coded scan sheet, and a return envelope coded to determine non-respondents. Following a two-week waiting period, non-respondents were contacted and encouraged to return their questionnaires. Teachers who requested another research packet were mailed one. After another two-week waiting period, a third mailing of research packets containing a slightly altered cover letter was mailed to remaining non-respondents. The final rate of return was 89% (31 of 35) for the cooperating teachers representing 91% (21 of 23) of the cooperating student teaching centers. The data were analyzed using the Statistical Package for the Social Sciences v. 7.5. Research questions one and three were analyzed descriptively with frequencies, percentages, means, and standard deviations.

Results and Findings

As shown in Table 1, the cooperating teachers who participated in this study were overwhelming male; only two of the 31 respondents were female. Almost half (15) of the teachers held only a Bachelor's degree, while slightly more than half (16) had earned a Master's degree. All of the teachers were members of their state's professional organization, and slightly more than half (16) reported national affiliations. Nineteen of the instructors had 11 or more years of experience as an agriscience teacher, and 22 of the 31 had six or more years of service at their current school. Eighteen of the cooperating teachers had previously supervised four or more student teachers, and one-third had cooperated in the supervision of seven or more preservice teachers (Table 1).

Regarding selected school-setting characteristics, 12 of the 21 centers had a school-schedule with a 6-, 7-, or 8-period day and an 18-week semester, while the remaining centers reported various alternative scheduling patterns. There was a similar dichotomy regarding school size; 12 of the centers reported campus enrollments of 780 or more students and the remainder were smaller. Departmental enrollments were evenly split; that is, half reported student enrollments of 151 or greater while the remainder served fewer pupils. All but three of the 21 centers were multiple teacher departments, with 10 centers having two faculty members.

Table 1. Selected Characteristics of Cooperating Teachers (N=31)

Characteristics	Frequency	Percentage
Gender		
Male	29	93.5
Female	2	6.5
Highest Degree		
Bachelor's	15	48.4
Master's	16	51.6
Service as an Agriscience Teacher		
3 to 5 years	6	19.4
6 to 10 years	6	19.4
11 to 20 years	7	22.6
21 or more years	12	38.7
Number of Schools Taught Agriscience		
1	14	45.1
2	11	35.5
3 or more	6	19.3
Service at Current School		
Beginning first year	1	3.2
1 to 5 years	8	25.8
6 to 10 years	5	16.1
11 to 20 years	10	32.3
21 or more years	7	22.6
Student Teachers Supervised		
None	4	12.9
1 to 3	9	29.0
4 to 6	8	25.8
7 or more	10	32.3
Professional Affiliations		
VATAT[a] only	15	48.4
VATAT[a] and NAAE[b]	11	35.4
VATAT[a], NAAE[b], ACTE[c], and others	5	16.2

[a] Vocational Agriculture Teachers' Association of Texas
[b] National Association of Agricultural Educators
[c] Association for Career and Technical Education

The 34 "important elements" of the student teaching experience that were identified by cooperating teachers focus groups are shown in Table 2. The elements are grouped into five "core" areas and a "composite" mean computed for each area. Two core areas were tied for highest composite mean (4.69); they were "Classroom and Laboratory Instruction" (5 elements) and "Cooperating Teacher-Student Teacher Relationships" (9 elements). The core area "Student Leadership Development (FFA)" (7 elements) had the next highest composite mean (4.54). The core areas "Supervised Agricultural Experience Programs" (4 elements) and "School and Community Relationships" (9 elements) had the second lowest and lowest composite means (4.40 and 4.36, respectively).

Cooperating teachers rated elements (items) of the student teaching experience on level of importance ("5" = "High Importance"…"1" = "No Importance") via a mail questionnaire, all of the 34 items were perceived to have either "much" or "high importance" ($M \geq 4.00$) (Table 2). The overall mean was 4.54 or midway between "much" and "high importance." The highest rated element was "a well rounded program emphasizing instruction, SAEs, and youth leadership activities" ($M = 5.00$; $SD = .00$). "Daily (systematic) classroom and/or laboratory instruction" was the second highest rated element ($M = 4.94$; $SD = .25$), while the element "a cooperating teacher who has a positive attitude" was rated third ($M = 4.90$; $SD = .30$). Four elements, belonging to the core area "Cooperating Teacher-Student Teacher Relationships," tied for fourth ($M = 4.77$) (Table 2). "Recognized integrity of the cooperating teacher and program" ($M = 4.74$; $SD = .45$) was rated the eighth most important element, and two elements, "resources available to train a competitive team" ($M = 4.71$; $SD = .53$) and "a cooperating teacher who communicates clear expectations to the student teacher…" ($M = 4.71$; $SD = .46$), tied for ninth. The core area "Cooperating Teacher-Student Teacher Relationships" accounted for five of the ten highest rated elements. Of the remaining elements, 19 had mean importance ratings between 4.25 and 4.70, while five items had mean rating scores approaching "much importance" ($M < 4.25$). Four of the five lowest rated elements belonged to the core area "School and Community Relationships."

Table 2. Cooperating Teachers' Perceptions of the Important Elements of the Student Teaching Experience (N=31)

Elements[a]	M[b]	SD	Ranking	
Classroom and Laboratory Instruction				
Daily (systematic) classroom and/or laboratory instruction	4.94	.25	2	
A discipline management plan used in a structured environment	4.65	.55	12	
Current technology used in instruction	4.32	.70	27	
Creative teaching methods as a basis for day-to-day instruction, e.g., use of multimedia	4.52	.63	18	
A well-rounded program emphasizing instruction, SAEs, and youth leadership activities	5.00	.00	1	
Composite Mean[c]				4.69
Supervised Agricultural Experience Programs				
All students meeting State SAEP requirements, with accuraterecord books	4.48	.72	20	
Diversity within the students' SAEPs	4.10	.79	33	

(table continues)

Elements[a]	M[b]	SD	Ranking	
Project supervision and an explanation of this commitment to the student teacher	4.61	.50	14	
Student participation in advanced awards and degrees on district, area, state and national levels	4.39	.62	26	
Composite Mean[c]				4.40
Student Leadership Development (FFA activities)				
Strong classroom instruction in leadership development	4.55	.57	17	
These activities as essentials for a balanced program	4.68	.48	11	
A history of successful participation	4.32	.70	27	
Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs and LDEs)	4.52	.57	18	
Cooperating teachers who delegate the training of at least one team to the student teacher	4.58	.56	15	
Resources available to train a competitive team	4.71	.53	9	
Opportunities for the student teacher to judge or monitor a district or area Leadership Development Event (LDE)	4.42	.72	23	
Composite Mean[c]				4.54
School and Community Relationships				
Recognized integrity of the cooperating teacher and program	4.74	.45	8	
Dep'tal support organization(s) (e.g., advisory committees, booster clubs, and Alumni)	4.29	.69	29	
A cooperating teacher who supports other school activities (e.g., sports banquets)	4.10	.75	33	
A cooperating teacher who supports activities in the community (e.g., service organizations)	4.13	.81	32	
A spirit of professional cooperation among fellow teachers	4.58	.50	15	
Use of local media	4.23	.62	30	
School administrators who are involved in program activities	4.42	.62	23	
Community service projects	4.23	.67	30	
Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm)	4.48	.72	20	
Composite Mean[c]				4.36
Cooperating Teacher-Student Teacher Relationships				
A cooperating teacher who is willing to be a mentor	4.77	.43	4	
A student teacher who is willing to be mentored by the cooperating teacher	4.77	.43	4	
A cooperating teacher who has a positive attitude	4.90	.30	3	
A cooperating teacher who is a "good" role model	4.77	.50	4	

(table continues)

Elements[a]	M[b]	SD	Ranking	
A cooperating teacher who communicates clear expectationsto the student teacher (e.g., role in the classroom and calendar of events)	4.71	.46	9	
A cooperating teacher who provides frequent evaluations and feedback to the student teacher	4.65	.55	12	
Discipline policies that are in place and enforced	4.77	.43	4	
"Reinforcement" techniques in teaching (e.g., pace, reteaching, retesting, and accommodation of various learning styles)	4.45	.62	22	
Assistance in job placement	4.42	.62	23	
Composite Mean[c]				4.69
Overall Mean				4.54

[a] Important elements were determined by focus groups and reflect the groups' "language."
[b] 5 = High Importance…1 = No Importance.
[c] Composite mean of elements for that core area.

Conclusions, Implications, and Recommendations

Based on findings of this study, cooperating teachers used by the Department of Agricultural Education at Texas A&M University were predominantly male, members of their state's professional organization (VATAT), and generally experienced teachers who were likely to have had several years of service at their school. Most of the teachers had previous experience supervising student teachers and were most likely employed in a multiple teacher department staffed by two instructors.

Focus groups perceived that the "traditional" triad associated with secondary-level agricultural education (i.e., classroom/laboratory instruction, the FFA, and SAEs) was an important component of the student teaching experience. This perception was confirmed by teachers' ratings of importance when queried via a mail questionnaire; "instruction" was the most important of these three areas. However, found to be equally "important" were those elements belonging to the core area "Cooperating Teacher-Student Teacher Relationships" (Table 2). Other researchers (Martin & Yoder, 1985) have made a similar contention. Interestingly, the core area "School and Community Relationships," although considered "important," had the lowest composite mean for the five areas. Moreover, investigators (Edwards & Briers, 1998; Garton & Chung, 1995; Mundt & Connors, 1999) have found that early-career agriculture teachers identify a need for inservice education in this area. Does expression of this "need" by beginning teachers arise because of a lower "value" that cooperating teachers may have for this part of the student teaching experience? Perhaps student teachers were not being adequately exposed to "related" learning opportunities; and, then, on becoming a practicing teacher, they realized that they were lacking in these professional competencies. This potential "association" between inservice education needs of novice teachers and perceptions of cooperating teachers about important elements of student teaching warrants further study.

Regarding research methodology, what is implied by the fact that all of the important elements, as determined by focus groups, were rated either "much" or "high" in importance when teachers were surveyed via a mail questionnaire? Did one approach simply "confirm" the findings of the other (Stewart & Shamdasani, 1990)? This implies that either data collection method was equally "valid," at least for the purpose of gathering this type of information from this particular "sample." Moreover, what if the questionnaire items had been generated by a "non-indigenous" source (e.g., the researchers)? Then, how similar, different, or valid would the questions have been and, ultimately, the study's findings? Is it conceivable that the similarity of the findings can be attributed to the fact that the questionnaire items were "crafted" by a stakeholder group (i.e., cooperating teachers) that was arguably one of the most qualified sources for this purpose (Krueger, 1994; Morgan, 1997; Popham, 1993; Stewart & Shamdasani, 1990)? Accepting this premise, these findings support Krueger's (1994) assertion that "benefits" can be reaped by properly applying "methodological mixes" to a research design. Further, the findings of this study and their implications appear to support Miller's (1998) contention. That is, using a "soft systems" methodological approach when attempting to "understand" complex behaviors that are problem-centered and highly contextual (i.e., the student teaching experience) is an appropriate procedure.

Recommendations for practice and future research: 1) Prior to student teaching, preservice teachers should be made aware of the important elements of the student teaching experience identified by cooperating teachers. These elements should be used as a "framework" for examining and anticipating cooperating teachers' "expectations" for the student teacher and the student teaching experience. Further, these elements can serve as "talking points" (i.e., points of reference) for the student teacher, when defining and "negotiating" duties, roles, and responsibilities with their cooperating teacher at the onset of student teaching. 2) Student teachers should be surveyed using a similar quantitative instrument. If significant areas of "disagreement" arise, these areas could serve as "directed-questions" for student teacher focus groups, and explored as to "why" they are perceived to be less or more important. Concomitantly, cooperating teacher groups should examine "why" teachers perceive these elements to be important. Then, with a "greater" understanding of both groups' perceptions, teacher educators can design and implement preservice learning activities to address any incongruence that might be a limiting factor preventing development of an effective cooperating teacher-student teacher relationship (Martin & Yoder, 1985). 3) Researchers are encouraged to consider using a focus group approach when deemed an appropriate methodology for their investigation, for example, to collect data, to design and refine instruments, to generate hypotheses, and to confirm earlier findings (Krueger, 1994; Morgan, 1997; Popham, 1993). 4) Moreover, to further strengthen our collective understanding of the potential "value" and the possible "limitations" of research that involves both qualitative and quantitative methodologies (i.e., "mixed methods"), researchers are urged to conduct investigations that incorporate both approaches (Krueger, 1994), compare their findings, and report their conclusions.

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Cooperating Teachers' Perceptions of Important Elements of the Student Teaching Experience: A Focus Group Approach with Quantitative Follow-up

A Critique

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Edwards and Briers present a study that explores what cooperating teachers believe are important elements in a preservice student teaching experience in agricultural education. As they stated, these important members of the education community have not been involved much in investigations of the student teaching experience, which makes this study timely and appropriate. The Introduction and Theoretical Framework section of the paper flows well and is well written, although I would classify this section as a "Conceptual Framework," and it was not clear to me why the authors devoted a significant amount of space discussing the methodology in this section of the paper. This discussion belongs in the Methods section, which would leave additional room to develop a more in-depth theoretical or conceptual framework focused on the student teaching experience. Dewey's notions of the clinical experience might be important to this discussion.

The methods of the study are clearly outlined and easy to follow. The purpose and research questions were appropriate to the study, but led to an important question. Why use the same participants for both the focus group discussions and the subsequent quantitative survey and what differences did the authors hope to uncover in responses (and how)? While this procedure does not appear to validate any methodological assumptions, I would question its usefulness. The authors should consider distributing the survey instrument to a random sample of Texas secondary agriculture teachers (or others) to assess the importance of the identified elements.

The results of the study are well-written and easy to follow. The tables are also well done, but I would caution the authors against repeating too much information contained in the table in the accompanying text. This space would be better utilized for more in-depth discussion of the broader meanings of the results. My earlier comments regarding the use of focus group participants for the survey are sufficient to address some of the questions posed by the authors in their discussion of the results. The authors have attempted to share a research methodology not typically utilized in agricultural education research. More efforts such as this to broaden our research methods base are definitely needed. This section could have been enhanced with some deeper insights into how the researchers believe using this type of methodology enhanced their results. In addition, the authors related results to the theoretical framework.

Edwards and Briers are to be commended for conducting a good research study and presenting its findings to us in a well-written paper. I enjoyed reading it.

An Assessment of South Carolina Agriculture Teachers' Inservice Needs and Perceived Competencies

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Abstract

The purpose of the study was to determine current inservice needs of beginning and experienced agriculture teachers in South Carolina. The target population of the study consisted of all secondary agriculture teachers in South Carolina. Based on the Borich Needs Assessment Model, a modified list of 50 competencies from previous research was developed to assess needs of South Carolina teachers (N=105) during the 1999-2000 academic year. Using a census population, the perceived level of importance and perceived level of competence of the 50 competencies of the teachers were measured. To determine specific needs, beginning teachers ($\leq$5 years experience) and experienced teachers were analyzed separately. Overall inservice needs were analyzed and ranked using Mean Weighted Discrepancy Scores (MWDS). The top five competencies in need by experienced agriculture teachers included: using computers in classroom teaching (3.95); preparing FFA degree applications (3.91); preparing proficiency award applications (3.83); using multimedia equipment in teaching (3.60); teaching record-keeping skills (3.19). In contrast, beginning teachers listed the following top five competencies in need: utilizing a local advisory committee (5.56), developing local adult education programs (5.19), organizing fund raising activities for the local FFA chapter (5.18), preparing agriculture/FFA contest teams (4.73), developing SAE opportunities for students (4.51). When analyzing inservice needs of beginning and experienced teachers, five of the top 10 competencies were found to be the same: developing local adult education programs; developing SAE opportunities for students; preparing FFA Degree applications; completing reports for local/state/federal accountability, and preparing proficiency award applications. Regarding beginning agriculture teachers, six of the top 10 competencies identified in this study were also identified by Garton and Chung's (1995) study of beginning agriculture teachers in Missouri. Specific recommendations for inservice of beginning and experienced agriculture teachers were made: experienced agriculture teachers should be targeted for inservice programs that expose them to FFA/youth development issues; development of related program administration and FFA/SAE/Young Farmer coursework in a distance education format may help reduce teacher travel; teacher educators in the agricultural education program at Clemson should develop graduate courses that address program administration needs and FFA/SAE/Young Farmer program development, and the teacher education program and the state agriculture education division of the State Department of Education should work together to address the top 10 inservice needs of all South Carolina agriculture teachers.

Introduction and Theoretical Framework

Our aging population, its growing diversity, changing career patterns, and advances in science and industry have all contributed to the changing nature of adult education. Education is no longer viewed as preparation for productive adulthood; it is increasingly being seen as a lifelong necessity for personal and social well-being (Rachal, 1989). Without question, teachers are faced with challenges trying to provide an adequate learning environment and prepare their students for productive lives in today's fast-paced world. Consequently, teachers are among those for whom learning is now more than ever a lifelong proposition. There have been ways identified to train and retrain teachers, such as college courses, correspondence courses, self-learning experience, and inservice. That is why so many educational researchers aim their studies at evaluation of teacher training to measure its effectiveness.

Borich (1980) pioneered his Needs Assessment Model in an effort to design such a survey instrument that would allow one to collect data that can be weighted and ranked in order of priority. By doing so, responses can be linked to a practical decision framework to improve a training program. Borich defined a training need as "a discrepancy between an educational goal and trainee performance in relation to this goal." He further suggested that training programs could utilize his model by employing the two extreme position: *what is* (the measured behaviors, skills, and competencies of trainees) and *what should be* (the goals of the training program). According to Borich, the discrepancy between these two positions can be used as an index to determine the effectiveness of training. The Borich Needs Assessment Model involves 4 steps:

1. List Competencies;
2. Survey Inservice Teachers;
3. Rank Competencies, and
4. Compare High Priority Competencies with Training Program Content.

In recent years, several studies have used Borich's needs assessment model to identify inservice needs of agriculture teachers (Garton & Chung, 1995; Edwards & Briers, 1999; Mundt & Connors, 1999). Garton and Chung (1995) used the Borich Needs Assessment Model in their study of beginning teachers in Missouri. Their study revealed 12 of the 50 professional competencies in greater need for inservice: completing reports for local/state administrators, motivating students to learn, preparing FFA degree applications, developing an effective public relations program, preparing proficiency award applications, teaching agriscience, utilizing a local advisory committee, developing SAE opportunities for students, using computers in classroom teaching, supervising students' SAE programs, teaching using experiments, and conducting local FFA chapter activities.

However, Garton and Chung also found that 10 of the 50 professional competencies were rated to be less of a need for inservice: teaching knowledge and skills in agricultural construction, teaching about and agriculture's relationship with the environment, teaching knowledge and skills in plant science, conducting parent/teacher conferences, using multimedia equipment in teaching, implementing VIMS in the local program, planning and conducting student field trips, developing knowledge and skills in animal science, teaching knowledge and skills in soils and soil management, and teaching equine science.

Edwards and Briers (1999) also used the Borich Needs Assessment Model for their study of entry-phase agriculture teachers in Texas. The findings of that study were on many levels consistent with the above-mentioned study by Garton and Chung. For example, 4 out of top 15 competencies in the Edwards and Briers study were as follows: assisting students in preparing for and succeeding in FFA degree and award program, using the Internet as a teaching tool, implementing Tech-Prep and other S-T-W initiatives into the program, and integrating CAD into mech.

Mundt and Connors (1999) conducted a three-stage Delphi study of the winners of the NVATA Outstanding Young Member Award that was aimed at identifying problems and challenges associated with the first years of teaching agriculture. A technique was used in that study. The top 8 categories out of a list of 23 problems and challenges were as follows: managing the overall activities of the local FFA chapter, building the support of faculty, counselors, and administrators within the school system, balancing professional and personal responsibilities and maintaining personal motivation and a positive outlook, recruiting and motivating students in agricultural education, using proper classroom management strategies and dealing with student discipline problems, properly managing time, paperwork and meeting deadlines, building support from parents, organizations and adult groups within the community, and organizing and managing safe and attractive facilities.

Barrick, Ladwig, & Hedges (1983) stated that the identification of relevant topics can be crucial in providing agriculture teachers with quality inservice programs. In order to provide quality inservice programs, agriculture teachers' needs have to be monitored on a regular basis (Birkenholz & Harbstreit, 1987). According to Waters and Haskell (1989), "gathering data from potential clientele and actively involving them in the process of identifying potential educational programs, increases the likelihood of implementing relevant educational programs; thus, increasing the likelihood of achieving appropriate outcomes" (p. 26)

As can be seen from the literature review, many recent studies focused on needs of beginning agriculture teachers. In addition to these studies, however, more inservice needs assessment research on experienced teachers is necessary. Following the many changes in agriculture in general and re-building of agricultural education staff in South Carolina state supervision and faculty at Clemson University in particular, inservice needs assessment has become imperative for both groups of teachers.

Purpose and Objectives

The purpose of this study was to identify and describe specific inservice needs of beginning and experienced agriculture teachers in the state of South Carolina. The objectives for the study were to:

1. Describe the demographic profile and program characteristics of South Carolina agriculture teachers (age, gender, highest degree earned, years of teaching, and curriculum taught);
2. Identify and describe the perceived inservice needs of South Carolina experienced agriculture teachers;
3. Identify and describe the perceived inservice needs of South Carolina beginning agriculture teachers; and
4. Compare and contrast the perceived inservice needs of experienced South Carolina agriculture teachers to those of South Carolina beginning agriculture teachers.

Methods and Procedures

The population for the study consisted of all (beginning and experienced) agriculture teachers in the state of South Carolina (N=105). For the purpose of this study, beginning teachers were considered to have between one and five years of teaching experience. Experienced teachers were considered to be those with more than five years of teaching experience. The list of agriculture teachers was obtained from the 1999-2000 South Carolina Directory of Agricultural Educators. Census populations were used and as such the findings from this study can only be generalized to the population.

The instrument used in the study was developed on the basis of the Borich Needs Assessment Model (Borich, 1980). A list of 50 professional competencies from previous research (Garton & Chung, 1995; Kahler, 1974; Shippy, 1981; Hachmeister, 1981; Claycomb & Petty, 1983; Veeman, 1984; Birkenholz & Harbstreit, 1987; Mundt, 1991; Valli, 1992; Talbert, Camp & Heath-Camp, 1994) was modified to meet needs of South Carolina teachers.

The teachers were asked to rate on a Likert-type scale the 50 professional competencies related to inservice needs. Number 1 on the scale signified the least important competency and number 5 was the most important competency. The teachers were also asked to rate their self-perceived levels of the 50 professional competencies by using a Likert-type scale with number 1 meaning the least proficient in a particular competency and number 5 as the most proficient. The instrument also contained sections related to the Internet and computer software access, time of inservice delivery, and teachers' demographic information.

A panel of experts was asked to review the instrument for content and face validity. The panel consisted of faculty members in the Department of Biology Instruction and Agricultural Education at Clemson University. A post-hoc reliability analysis of the inservice needs section of the instrument was calculated for the beginning teachers (importance level .83; competence level .96) and the experienced teachers (importance level .97; competence level .98).

Data were collected by sending the instrument and cover letter to all teachers in the study during March, 2000. To expedite the return rate, two options suggested -- teachers could return the completed instrument by fax or return it to their regional coordinators. The response rate for the study was 78 (74%). A t-test of the inservice needs and competency assessments revealed no significant differences between early and late respondents for both beginning and experienced teachers. Therefore, the findings of this study can be generalized to the entire population of both categories of agriculture teachers in South Carolina.

Statistical data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS 8.0) for Windows and Microsoft Excel 98. Descriptive statistics (frequencies, means, and standard deviations) were used to analyze data. A Mean Weighted Discrepancy Score (MWDS) was calculated to describe the overall rankings for each of the competencies.

To determine the Mean Weighted Discrepancy Score (MWDS), the following statistical methods were used with Microsoft Excel 98. A discrepancy score was calculated for each individual on each competency by taking the importance rating minus the ability (competency) rating. A weighted discrepancy score was then calculated on each individual for each of the professional competencies by multiplying the discrepancy score by the mean importance rating. A mean weighted discrepancy score for each of the competencies was calculated by taking the sum of the weighted discrepancy scores and dividing by the number of observations. Using the mean weighted discrepancy scores, the 50 competencies were then ranked.

Results and Findings

Objective 1 of the study was to describe the demographic profile and program characteristics of South Carolina agriculture teachers. The average number of years teaching was 14.7 years, while the most prevalent age group of the respondents was 41-50 (31.2%), followed by the 31-40 year age group (29.9%). Eighty-seven percent of the respondents were male and the most common academic degree held was a masters degree (59.7%), followed a bachelors degree (31.2%).

Regarding program characteristics, the primary curricula taught during the 1999-2000 school year was in the category of Horticulture and Agricultural Production (24.4%) followed by Agricultural Mechanics (16.7%), Environmental/Natural Resources (10.3%) and Agriscience (10.3%). Curricula of other programs included: Turfgrass (5.3), Forestry (1.3%), Agribusiness (1.3%), and Other (5.1%).

Teachers were also asked to describe preferred inservice time for offerings. The majority of teachers (66.7%) ranked summer as their first choice for workshop/seminar delivery. The winter conference was identified as the second preferred choice (16.9%), followed by district meetings (11.7%), fall (5.2%), and spring semester (1.3%).

Objective 2 of the study was to describe the perceived inservice needs of experienced South Carolina agriculture teachers using the Borich Needs Assessment Model. Table 1 provided an analysis of the inservice needs of experienced teachers, as ranked on the basis of the Mean Weighted Discrepancy Score (MWDS). The top 10 competencies included: using computers in classroom teaching (3.95); preparing FFA degree applications (3.91); preparing proficiency award applications (3.83); using multimedia equipment in teaching (3.60); teaching record-keeping skills (3.19); developing an effective public relations program (3.00); developing SAE opportunities for students (2.68); completing reports for local/state/federal accountability (2.65); organizing a local Young Farmer Agribusiness program (2.20), and developing local adult education programs (2.04). The mean scores for the importance of inservice and competency levels were included in Table 1.

In comparison to the 10 most preferred competency needs for inservice (Table 1), the 10 least preferred included: assessing and evaluating student performance (.21); teaching knowledge and skills in plant sciences (.14); managing student behavior problems (.07); teaching knowledge and skills in soils and soil management (.00); organizing fund raising activities for the local FFA chapter (-.06); developing relations with teachers and administrators (-.20); developing knowledge and skills in the animal sciences (-.23); planning banquets (-.30); conducting parent/teacher conferences (-.89), and planning and conducting student field trips (-1.05).

Table 1.
Inservice Needs of Experienced Agriculture Teachers Using the Borich Needs Assessment Model (N=60)

Ranking	Inservice Need	Mean Imp. Level[a]	Mean Comp. Level[b]	MWDS[c]
1	Using computers in classroom teaching	4.09	3.12	3.95
2	Preparing FFA Degree applications	3.98	3.09	3.91
3	Preparing proficiency award applications	3.90	2.91	3.83
4	Using multimedia equipment in teaching	3.76	3.05	3.60
5	Teaching record-keeping skills	3.98	3.10	3.19
6	Developing an effective public relations program	4.14	3.41	3.00
7	Developing SAE opportunities for students	4.12	3.39	2.68
8	Completing reports for local/state/federal accountability	3.81	3.19	2.65
9	Organizing a local Young Farmer Agribusiness program	3.88	3.24	2.20
10	Developing local adult education programs	3.95	3.43	2.04
11	Teaching about public issues regarding agriculture	3.72	3.19	1.99
12	Teaching agribusiness knowledge and skills	3.52	3.11	1.95
13	Utilizing a local FFA Alumni affiliate	3.40	2.83	1.93
14	Motivating students to learn	4.10	3.64	1.91
15	Preparing agriculture/FFA contest teams	3.93	3.53	1.89
16	Teaching using experiments	3.64	3.29	1.82
17	Supervising students' SAE programs	4.02	3.51	1.74
18	Conducting needs assessments and surveys to determine the courses that should be taught	3.59	3.18	1.73
19	Teaching students problem-solving and decision-making skills	4.03	3.64	1.60

(table continues)

Table 1 (continued)

Ranking	Inservice Need	Mean Imp. Level[a]	Mean Comp. Level[b]	MWDS[c]
20	Locating and selecting student references and materials	3.52	3.23	1.50
21	Developing a Local Program Success Model	3.60	3.34	1.47
22	Teaching knowledge and skills in small animal care	3.40	3.04	1.43
23	Teaching about agriculture's relationship with the environment	3.98	3.66	1.30
24	Teaching equine science	2.84	2.46	1.27
25	Teaching agricultural leadership	4.10	3.88	1.25
26	Coordinating activities with local agricultural organizations and activities	3.79	3.47	1.24
27	Conducting local FFA chapter activities	3.97	3.75	1.13
28	Teaching learning disabled students	3.67	3.31	1.10
29	Teaching global agriculture awareness	3.48	3.17	1.08
30	Teaching agriscience – integrating science and agriculture	3.79	3.58	1.08
31	Organizing and supervising teaching laboratories	3.83	3.55	1.06
32	Teaching environmental occupations skills	3.64	3.42	1.04
33	Developing performance based assessment instruments	3.48	3.28	0.93
34	Teaching agricultural mechanics skills	4.00	3.69	0.93
35	Teaching knowledge and skills in marketing agricultural products	3.36	3.16	0.87
36	Planning a community-based program	3.71	3.50	0.77
37	Utilizing a local advisory committee	3.98	3.79	0.76
38	Determining the content to be taught in certain courses	3.84	3.74	0.69
39	Teaching knowledge and skills in forestry	3.48	3.42	0.44
40	Teaching knowledge and skills in horticulture	3.90	3.88	0.35
41	Assessing and evaluating student performance	3.74	3.82	0.21
42	Teaching knowledge and skills in plant sciences	3.81	3.84	0.14
43	Managing student behavior problems	3.84	3.76	0.07
44	Teaching knowledge and skills in soils and soil management	3.67	3.80	0.00

(table continues)

Table 1. (continued)

Ranking	Inservice Need	Mean Imp. Level[a]	Mean Comp. Level[b]	MWDS[c]
45	Organizing fund raising activities for the local FFA chapter	3.53	3.61	-0.06
46	Developing relations with teachers and administrators	3.83	3.88	-0.20
47	Developing knowledge and skills in the animal sciences	3.28	3.40	-0.23
48	Planning banquets	3.48	3.57	-0.30
49	Conducting parent/teacher conferences	3.55	3.86	-0.89
50	Planning and conducting student field trips	3.66	3.11	-1.05

Note. [a] = Importance level: 1 = least important, 5 = most important
[b] = Competency level: 1 = least proficient, 5 = most proficient
[c] = MWDS: Mean Weighted Discrepancy Score

Objective 3 was to describe the perceived inservice needs of South Carolina beginning agriculture teachers as measured by the Borich Needs Assessment Model. Table 2 provided an analysis of the inservice needs of beginning teachers, as ranked on the basis of the Mean Weighted Discrepancy Score (MWDS). The top ten competencies included: utilizing a local advisory committee (5.56), developing local adult education programs (5.19), organizing fund raising activities for the local FFA chapter (5.18), preparing agriculture/FFA contest teams (4.73), developing SAE opportunities for students (4.51), preparing FFA Degree applications (4.47), developing performance based assessment instruments (4.28), completing reports for local/state/federal accountability (4.26), preparing proficiency award applications (4.05), and Supervising students' SAE programs (3.83). The mean scores for the importance of inservice and competency levels are shown in Table 2.

In comparison to the 10 most preferred competency needs for inservice (Table 2), the ten least preferred included: teaching agriscience – integrating science and agriculture (1.56); planning banquets (1.51); conducting parent/teacher conferences (1.49); teaching knowledge and skills in small animal care (1.48); locating and selecting student references and materials (1.43); teaching knowledge and skills in plant sciences (1.35); teaching agricultural mechanics skills (1.30); developing knowledge and skills in the animal sciences (1.13); planning and conducting student field trips (0.94), and teaching equine science (0.63).

Table 2.
Inservice Needs of Beginning Agriculture Teachers of Agriculture Using the Borich Needs Assessment Model (N=18)

Ranking	Inservice Need	Mean[a] Imp. Level	Mean[b] Comp. Level	MWDS[c]
1	Utilizing a local advisory committee	4.00	2.61	5.56
2	Developing local adult education programs	3.89	2.56	5.19
3	Organizing fund raising activities for the local FFA chapter	4.06	2.78	5.18
4	Preparing agriculture/FFA contest teams	4.06	2.89	4.73
5	Developing SAE opportunities for students	4.06	2.94	4.51
6	Preparing FFA Degree applications	3.83	2.67	4.47
7	Developing performance based assessment instruments	4.06	3.00	4.28
8	Completing reports for local/state/federal accountability	3.83	2.72	4.26
9	Preparing proficiency award applications	3.83	2.78	4.05
10	Supervising students' SAE programs	4.06	3.11	3.83
11	Developing an effective public relations program	4.33	3.50	3.61
12	Teaching record-keeping skills	3.89	3.00	3.46
13	Organizing a local Young Farmer Agribusiness program	3.56	2.61	3.36
14	Motivating students to learn	4.28	3.50	3.33
15	Teaching about public issues regarding agriculture	4.11	3.33	3.20
16	Organizing and supervising teaching laboratories	4.11	3.33	3.20
17	Assessing and evaluating student performance	4.33	3.61	3.13
18	Conducting local FFA chapter activities	3.72	2.89	3.10
19	Developing relations with teachers and administrators	4.22	3.50	3.05
20	Conducting needs assessments and surveys to determine the courses that should be taught	3.89	3.11	3.02
21	Teaching students problem-solving and decision-making skills	4.50	3.83	3.00
22	Utilizing a local FFA Alumni affiliate	3.56	2.72	2.96
23	Teaching using experiments	4.06	3.39	2.70
24	Using multimedia equipment in teaching	3.72	3.00	2.69
25	Planning a community-based program	3.83	3.17	2.56
26	Teaching knowledge and skills in horticulture	4.17	3.56	2.55
27	Teaching knowledge and skills in forestry	3.72	3.11	2.27

(table continues)

Table 2. (continued)

Ranking	Inservice Need	Mean[a] Imp. Level	Mean[b] Comp. Level	MWDS[c]
28	Determining the content to be taught in certain courses	4.39	3.89	2.19
29	Teaching environmental occupations skills	4.00	3.50	2.00
30	Coordinating activities with local agricultural organizations and activities	3.89	3.39	1.94
31	Using computers in classroom teaching	3.78	3.28	1.89
32	Teaching about agriculture's relationship with the environment	4.22	3.78	1.88
33	Teaching knowledge and skills in marketing agricultural products	3.61	3.11	1.81
34	Teaching knowledge and skills in soils and soil management	3.56	3.06	1.78
35	Developing a Local Program Success Model	3.17	2.61	1.76
36	Teaching agribusiness knowledge and skills	3.39	2.89	1.69
37	Teaching learning disabled students	3.78	3.33	1.68
38	Teaching global agriculture awareness	3.67	3.22	1.63
39	Managing student behavior problems	4.17	3.78	1.62
40	Teaching agricultural leadership	4.06	3.67	1.58
41	Teaching agriscience – integrating science and agriculture	4.00	3.61	1.56
42	Planning banquets	3.39	2.94	1.51
43	Conducting parent/teacher conferences	3.83	3.44	1.49
44	Teaching knowledge and skills in small animal care	3.33	2.89	1.48
45	Locating and selecting student references and materials	3.67	3.28	1.43
46	Teaching knowledge and skills in plant sciences	4.06	3.72	1.35
47	Teaching agricultural mechanics skills	3.33	2.94	1.30
48	Developing knowledge and skills in the animal sciences	3.39	3.06	1.13
49	Planning and conducting student field trips	3.39	3.11	0.94
50	Teaching equine science	2.83	2.61	0.63

Note. [a] = Importance level: 1 = least important, 5 = most important
[b] = Competency level: 1 = least proficient, 5 = most proficient
[c] = MWDS: Mean Weighted Discrepancy Score

Objective 4 of the study was to compare and contrast the perceived inservice needs of South Carolina experienced agriculture teachers to those of South Carolina beginning agriculture teachers. An analysis of the differences between experienced teachers and beginning teachers found that five of the top 10 competencies were the same:

- Developing local adult education programs;
- Developing SAE opportunities for students;
- Preparing FFA Degree applications;
- Completing reports for local/state/federal accountability, and
- Preparing proficiency award applications.

The remaining top five competencies on which the beginning agriculture teachers had different responses were: utilizing a local advisory committee; organizing fund raising activities for the local FFA chapter; preparing agriculture/FFA contest teams; developing performance based assessment instruments, and supervising students' SAE programs (Table 3). The top five competencies on which experienced agriculture teachers differed from beginning agriculture teachers were as follows: using computers in classroom teaching; using multimedia equipment in teaching; teaching record-keeping skills; developing an effective public relations program, and organizing a local Young Farmer Agribusiness program.

Table 3.
Contrasting top competencies between beginning and experienced agriculture teachers as ranked by Mean Weighted Discrepancy Scores (MWDS)

Beginning Teachers	Experienced Teachers
Utilizing a local advisory committee	Using computers in classroom teaching
Organizing fund raising activities for the local FFA chapter	Using multimedia equipment in teaching
Preparing agriculture/FFA contest teams	Teaching record-keeping skills
Developing performance based assessment instruments	Developing an effective public relations program
Supervising students' SAE programs	Organizing a local Young Farmer Agribusiness program

Conclusions/Recommendations/Implications

This study resulted in the following conclusions and recommendations.

The top 10 competencies for inservice education that were ranked by experienced agriculture teachers (see Table 1) could be summarized in the two categories: integration of technology in the classroom and youth/adult development activities (FFA, Young Farmer and SAE). Regarding beginning agriculture teachers, six of the top ten competencies identified in this study were also identified by Garton and Chung's (1995) study of beginning agriculture teachers in Missouri. These common findings were:

1. utilizing a local advisory committee;
2. developing SAE opportunities for students;
3. preparing FFA degree applications;
4. completing reports for local/state/federal accountability;
5. preparing proficiency awards applications, and
6. supervising students' SAE programs.

Based on the findings of this study the recommendations are as follows:

- Experienced agriculture teachers should be targeted for inservice programs that expose teachers to FFA/youth development issues;
- Development of related program administration and FFA/SAE/Young Farmer coursework in a distance education format may help reduce teacher travel;
- Teacher educators in the agricultural education program at Clemson should develop graduate courses that address program administration needs and FFA/SAE/Young Farmer program development;
- The teacher education program and the state agriculture education division of the State Department of Education should work together to address the top 10 inservice needs of all South Carolina agriculture teachers;
- The agriculture education program should study how the top inservice areas for the beginning teachers can be addressed in the preservice program, and
- Further needs assessment studies need to be implemented using the Borich model in order to build a baseline of research data and to validate this study and other similar studies conducted in other states.

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An Assessment of South Carolina Agriculture Teachers' Inservice Needs and Perceived Competencies

A Critique

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Layfield and Dobbins addressed the in-service needs of South Carolina secondary agriculture teachers through an adaptation of the Borich Needs Assessment Model. They provided a fairly detailed conceptual framework for the study that could have been enhanced by the inclusion of a theoretical discussion of adult learning and, possibly, change theories. It consisted of a lot of lists reported from previous, similar studies. There was no inclusion of literature that might shed light on best in-service delivery mechanisms, and little to suggest why the authors chose to divide the teachers into two groups for the data analysis.

Although the section was very well written, I have some questions with the Methods and Procedures. The prior use of the Borich instrument was well documented, but no mention was made of what considerations were made in its adaptation. I also question the validity of dividing teachers into what is basically a dichotomy – those who have taught more than five years and those who have taught less than five years – as the data analysis may not allow for differences and similarities between persons at either end of the category. For instance, is there much difference between a person who has taught five years vs. 5 ½ years? And, isn't there likely to be a lot of difference between an individual in his/her first year of teaching vs. someone who has taught five years?

Data from the survey are presented well in both the text and in tables. The authors should consider not repeating tabular data in the text so that space could be utilized for substantive discussions of the results or raising additional questions left unanswered by the examination of a mean. For example, in looking at Table 1, which presents in-service needs of experienced teachers, I am curious as to what causes teachers to perceive one item as needed less than another? A response would warrant some literature review and, possibly, further inquiry, but addressing questions like this that emerge through the data analysis can enhance the discussion of the results as well as shape future research. In addition, the use of a dichotomous grouping for the teachers would be problematic in trying to draw any comparisons between the two groups, for reasons stated above.

The authors make an attempt in the Conclusions section to relate their results to prior research in this area. This section, however, should be expanded to include more than a list of a few conclusions and recommendations. Although the section title includes implications, there are none provided. In summary, Layfield and Dobbins have undertaken an effort to identify in-service needs of agriculture teachers in South Carolina, and can be commended for taking teachers' expressed needs into account.

A Description of the Nature and Impact of Teaching Events and Alternate Forms of Beginning Teacher Assistance Experienced by Beginning Minnesota Agricultural Education Teachers

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Abstract

Between 1993 and 1995, 6.1% of United States public school teachers left teaching. Only 3 out of 10 teachers left for retirement (U.S. Department of Education, 1999). Researchers report that new teachers often experienced difficulty with classroom management and discipline, student motivation, room and lesson organization, locating adequate teaching materials, and understanding complex school systems (Griffen, 1985; Odell, 1986; Veenman, 1984). Thoughtfully designed induction programs appear to be one solution to retaining quality teachers. Beginning teachers involved in induction programs improve their self-confidence and classroom management, lesson planning, and discipline (Conner, 1984; Eisner, 1984). Teachers involved in induction programs also have more positive attitudes toward teaching and plan to stay teaching longer than those not involved in induction programs (Henry, 1988; Odell & Ferraro, 1992; Varah, Theune, & Parker, 1986).

This study sought to determine the impact and occurrence of different forms of assistance provided by local school districts to 19 beginning Minnesota agricultural education teachers. Using measures from a questionnaire developed by Heath-Camp, Camp, Adams-Casmus, Talbert and Barber (1992), the results of the study show that the forms of assistance that had the greatest impact were parental support for the program, adequate written instructional materials, and available planning time before school started. The most frequently reported forms of assistance were an orientation on school policies, planning time before school, parental support, and a new teacher workshop.

The study also sought to describe events experienced by the beginning teachers. Seven of the 39 listed events were perceived to have a critical impact. The events were: 'I feel in control of my program', 'students act with respect towards me', 'I feel self confident in my classroom teaching', 'I experience satisfaction when an activity succeeds', 'I see my students succeeding in my class, 'my principal supports me', and 'I have more work to do than I have time to do it'. Three events that happened the least and had a major impact on the beginning teachers were: 'receiving feedback from my principal', 'having inadequate curriculum materials', and 'receiving gratitude from my students'.

Thirty-seven percent of the teachers were involved in a locally administered beginning teacher assistance program. Findings revealed the beginning teachers were moderately satisfied and experiencing high levels of stress. Only 53% of the teachers indicated they planned to continue teaching one year later.

The findings of this study support many of the findings reported by Camp et al. (1992). Results of this study were used to inform the practice of the coordinator, mentors, and partners involved with the Minnesota Teacher Induction Program during the 1999-2000 academic year.

Introduction and Theoretical Framework

The retention of quality teachers in the public school systems has been a topic of continuing concern. Between the1993-94 and 1994-95 school years, 6.1 % of the teachers in the United States left the teaching profession. Seventy percent of the teachers leave the profession for reasons other than retirement (U.S. Department of Education, 1998). Unfortunately, up to 50% of our beginning teachers consistently leave the profession before the end of their sixth year of teaching (Curtis, 1985; Jensen, 1986).

According to Schulman (1987), teaching may be one of the most difficult of all professions to master. Few other professions expect the first-year practitioner to immediately perform at the same level as their experienced colleagues. This pressure results in a transition from student to first-year teacher that is traumatic for many and has been referred to in the literature as "reality shock" (Marso and Pigge, 1987). Many education scholars agree the first year of teaching is exceptionally challenging (Huling-Austin, Odell, Ishler, Hay, & Edelfelt, 1989; Veenman, 1984).

Research conducted in the 1980's found that beginning teachers are less confident, qualified, or competent than teachers who graduated from teacher education programs in earlier years (Gardner, 1983). New teachers often experienced difficulty with classroom management and discipline, student motivation, room and lesson organization, locating adequate teaching materials, understanding complex school systems and policies, and meeting the needs of individual students (Griffen, 1985; Odell, 1986; Veenman, 1984). Findings from research conducted in the 1990's also support these findings.

In a descriptive study of eight beginning agricultural education teachers in Idaho, Mundt (1991) found many of the same problems and concerns. The most notable problems and concerns were the conditions of the physical facilities; classroom management and discipline problems; organizational issues; managing the FFA component; a need for more supervision and help from the principal; and determining curriculum scope, sequence, and pace. Additionally, Mundt found that the beginning teachers were quiet, frustrated, isolated, afraid, angry, confused, and generally lacked confidence.

Heath-Camp, Camp, Adams-Casmus, Talbert and Barber (1992) conducted a national study and reported that many schools did provide support activities for beginning teachers. However, nearly 25% of the beginning teachers were not given a curriculum guide and 25% were never observed or visited by the principal during their entire first year of teaching. In case studies of three beginning agricultural education teachers, Talbert, Camp, & Heath-Camp (1994) found the important problems included student discipline, advising the FFA chapter, preparing for multiple classes, managing the laboratory, ordering supplies, time management, lesson planning, and classroom/laboratory management.

In a study of state winners of the NVATA Outstanding Young Member Awards, Mundt and Connors (1999) also found the young members experienced many of the same concerns as reported for other beginning teachers. The primary concerns of the young members were: managing the overall activities of the local FFA Chapter; building support within the school system; balancing professional and personal responsibilities; recruiting and motivating students in agricultural education; using proper classroom management and discipline strategies; time management; organizing and managing safe and attractive facilities; and building support from parents, organizations and adult groups within the community.

Many of the problems experienced by the beginning teachers may correspond with different stages within alternate models of teacher development. Fuller and Bown (1975) suggest that there are three stages in the development of teachers (survival, teacher situation concerns, and pupil concerns). Waters (1988) followed a similar framework when he described a three-stage model for teacher professional development consisting of self, task, and impact. Ryan (1986) conceptualized the development of teachers to include an initial fantasy stage, followed by survival, mastery, and impact. Furlong and Maynard (1995) proposed a five-stage model after studying the activities, practices and experiences of a large cohort of student teachers. The stages include early idealism, personal survival, dealing with difficulties, hitting a plateau, and moving on.

To increase retention and improve instruction during each stage of induction and development, reformers have called for teacher induction programs to ease the transition of beginning teachers into full-time teaching (Huling-Austin, 1990; Odell, 1986). Interest in beginning teacher induction programs has spread rapidly in the U.S.A. The occurrence of state-level induction activities increased from 14 states in 1983 to 47 states in 1988 (Defino and Hoffman, 1984; Neuweiler, 1988). In 1999, the percentage of beginning full-time public school teachers who had participated in a formal induction program during their first year of teaching had increased from 59% in 1993-94 to 65% in 1998. The report also indicated that 22% of the formal induction programs were 8 months or less; 66% were 9 months to one year, and 12% were more than one year (U.S. Department of Education, 1999).

Though implemented to assist in their socialization into the profession and improve their quality of teaching, beginning teachers enrolled in teacher induction programs improve in self-confidence and classroom management (Conner, 1984), lesson planning and discipline (Eisner, 1984), and specific behaviors such as voice inflection, eye contact, and review techniques (Huling-Austin and Murphy, 1987). Research results also indicate that teachers involved in induction programs have more positive attitudes toward teaching and plan to continue in the profession longer than those who have not participated in induction programs (Henry, 1988; Odell & Ferraro, 1992; Varah, Theune, & Parker, 1986).

Minnesota can ill-afford to loose beginning agricultural education teachers. Increased student enrollments at the secondary, postsecondary, and adult level along with the annual retirement of many of it best teachers has left the state with a shortage of teachers. The Division of Agricultural, Food, and Environmental Education at the University of Minnesota has initiated a multi-faceted approach to recruitment, preparation, and retention of quality instructors in response to the current and upcoming teacher shortages. Aware of these needs as well as the need for the beginning teachers to be properly socialized into the teaching profession, leaders of agricultural education in Minnesota established a teacher induction project for beginning agricultural education teachers. The pilot teacher induction program was developed in cooperation with the Minnesota Department of Children, Families, and Learning; the Minnesota Association of Agricultural Educators; local school district administrators; and the Minnesota Agricultural Education Leadership Council. In order to provide for more effective planning, monitoring, and delivery of the teacher induction project programming, researchers understood the importance of further understanding the backgrounds, characteristics, and needs of the diverse cohort of beginning teachers that came from five Midwestern agricultural education teacher education programs and 19 different secondary Minnesota schools.

Purpose and Objectives

The purpose of the study, therefore, was to determine the nature of the events experienced and forms of beginning teacher assistance provided by school personnel to beginning Minnesota secondary agricultural education teachers. The objectives of the study were to describe the:

1. demographic characteristics of the beginning agricultural education teachers;
2. nature and impact of the assistance provided to beginning agricultural education teachers by local school district personnel;
3. nature and impact of the events experienced by beginning agricultural education teachers; and
4. perceptions of the beginning agricultural education teachers relating to their levels of stress, satisfaction with their jobs, and mentoring assistance provided by local school district personnel.

Procedures

This census study was descriptive in nature. The population consisted of 19 self-selected beginning secondary agricultural education teachers who registered to participate in the Minnesota Agricultural Education Teacher Induction Project.

The research instrument consisted of a questionnaire developed and tested by Heath-Camp et al. (1992). The instrument was re-formatted to improve readability (different font, layout, and line spacing). The questionnaire consisted of three sections: demographic information, forms of assistance provided by local school personnel, and events experienced by beginning teachers. For listed items in the 'form of assistance provided by local school personnel' section, the subjects indicated whether the event had occurred (yes/no) and then selected an impact rating on a five point Likert-type scale. For the listed items in the 'events experienced by beginning teachers' section, the subjects indicated the frequency rating on a five point Likert-type scale and then selected an impact rating on a five point Likert-type scale. The internal consistency values reported by Heath-Camp et al. (1992) were a Cronbach's Alpha coefficient of .74 for the OCCURRED/FREQUENCY scales and a Cronbach's Alpha coefficient of .88 for the EVENTS/IMPACT scale.

The questionnaire was initially distributed and administered by the researchers at a seminar for beginning agricultural education teachers in October of 1999. Participants unable to attend the seminar were contacted and provided a questionnaire. Questionnaires were returned through the mail within ten days of the seminar. The data from the questionnaire were entered into and analyzed in EXCEL©. Descriptive statistics were used to summarize the data from the three sections of the questionnaire.

Findings

Objective 1 Describe the demographic characteristics of the beginning agricultural education teachers.

The mean age of the19 Caucasian agricultural education teachers participating in the teacher induction program was 25.4 (SD=5.24) years. Sixteen teachers were employed on a full-time basis, three teachers taught on a part-time basis. The cohort of 47% (n=9) married and (53%) (n=10) unmarried teachers was made up of 58% (n=11) females and 42% (n=8) males. Eleven percent (n=2) and 89% (n=17) of the teachers completed masters and bachelors degrees, respectively.

The average length of contracts for the 16 full-time teachers was 10.5 (SD=1.04) months. The average salary for the full-time instructors was $29,013 (SD= $2157). The beginning teachers were afforded from two to thirty days to attend workshops and prepare for classes before the beginning of the 1999 – 2000 fall term.

Ninety five percent (n=18) and 16% (n=3) of the teachers taught in Minnesota high schools and middle schools, respectively. The teachers taught in schools and communities with a variety of populations. One or more members of the beginning agricultural education cohort taught classes in grades seven through twelve. Ninety-five percent (n=18) of the teachers taught students in grade 10-12. Five percent (n=1), 21% (n=4), and 74% (n=14) of the instructors taught students in grades 7, 8, and 9, respectively. All (n=19) of the teachers taught agricultural education courses. Sixteen percent (n=3) taught a course or courses in biology or industrial and technology education.

The mean time spent teaching in-school students was 21.11 (SD=9.18) hours per week. Planning for teaching, grading papers, and other teaching roles accounted for 19.26 (SD=8.77) hours each week. Completing non-teaching activities, such as working with the FFA and other committees, occupied 7.17 (SD=6.78) hours of their weekly schedule. Supervision of student work experience beyond regular school hours required a weekly investment of 1.58 (SD=2.29) hours. The mean time investment for the full-time teachers was 54.88 (SD=13.4) hours per week

Objective 2 Describe the nature and impact of the assistance provided to beginning agricultural education teachers by local school district personnel.

The beginning agricultural education teachers were asked whether each of the assistance items in the questionnaire had occurred. The four most frequently reported forms of assistance were planning time before school (100%), orientation on school policies (89%), new teacher workshop (84%), and parental support (83%). See Table 1. Fourteen of the twenty-two forms of assistance provided by local school district personnel were perceived to have a major or critical impact on the beginning teachers (mean impact rating = 3.50 or higher). Parental support (M=4.37, SD=0.60) for the agricultural education program along with adequate materials, textbooks, and provided workbooks (M=4.26, SD=0.73) were the top two situations perceived to have the greatest impact on the teachers. The lowest rated item was orientation to the vocational student organization (M=2.95, SD=1.43).

A comparison of the columns of data in Table 1 indicates that the assistance items rated as major or critical were also among the most frequently reported. Of the fourteen items rated at an impact score of 3.50 or higher, nine were reported to have occurred by over half of the respondents. The extra planning period for beginning teachers was viewed by the cohort of beginning teachers to have a potential major impact (M=3.79, SD=1.23), however, it was experienced by only 5% of the respondents.

The assistance items rated as having a moderate impact (2.50 – 3.49) were also the least frequently reported. Of the eight items having a moderate impact, seven were reported to have occurred by less than half of the respondents. The workshops for new teachers were rated as having a moderate impact item (M=3.42, SD=0.96), although they were reported by 84% of the respondents.

Table 1 Occurrence and Impact of Selected Forms of Assistance Provided by Local School District Personnel for Beginning Agricultural Education Teachers

Forms of Assistance	Impact[1] M	SD	Percent Occurrence[2]
My students' parents provide support for my program	4.37	0.60	83
Adequate materials, textbooks, and workbooks are provided	4.26	0.73	74
Planning time was available before school started	4.16	1.01	100
Curriculum guides are available for my program area	3.95	1.22	42
My principal provided helpful evaluation and feedback	3.89	1.05	56
Extra planning period is provided for beginning teachers	3.79	1.23	5
Information on purchasing supplies/equipment is provided	3.79	1.08	53
Clerical support is provided for beginning teachers	3.79	1.03	42
A mentor or buddy teacher provided	3.74	1.10	63
A list of available resources and vendors was provided	3.72	1.13	37
An in-service on classroom management was provided	3.68	1.11	21
An orientation on school policies was given	3.63	1.01	89
An orientation tour of school facilities was given	3.58	1.30	58
Time is available to observe other teachers teaching	3.50	1.15	26
A teacher's aid is provided to beginning teachers	3.42	1.46	11
An in-service on time and stress management was provided	3.42	1.17	11
A workshop for new teachers was held	3.42	0.96	84
A beginning teachers' handbook was provided	3.37	1.12	42
Extra duties (bus, etc.) reduced for beginning teachers	3.21	1.44	26
An in-service on counseling students was provided	3.16	1.12	5
An in-service to explain the curriculum was provided	3.05	1.39	5
A Vocational Student Organization orientation was held	2.95	1.43	0

Note: [1] Impact Scale: 1 = None, 2 = Minor, 3 = Moderate, 4 = Major, 5 = Critical.
[2] Occurrence = percent of teachers reporting the occurrence.

Objective 3 Describe the nature and impact of the events experienced by beginning agricultural education teachers.

Table 2 Events and the Perceived Impact of the Events on the Beginning Agricultural Education Teachers

	Impact[2]		Frequency[2]	
Events	M	SD	M	SD
I feel in control of my program	4.79	0.42	3.63	0.68
Students act with respect towards me	4.74	0.56	3.79	0.54
I feel self-confident in my classroom teaching	4.74	0.45	3.74	0.73
I experience satisfaction when an activity succeeds	4.68	0.48	4.68	0.58
I see my students succeeding in my class	4.68	0.48	3.74	0.56
My principal supports me	4.63	0.60	3.84	1.30
I have more work to do than I have time to do it	4.53	0.70	4.63	0.68
My job allows me to be creative	4.42	0.61	4.37	0.68
I receive positive feedback from my principal	4.37	0.83	2.95	1.43
My peers act with respect towards me	4.37	0.68	4.26	0.73
The subject matter I teach is already familiar to me	4.37	0.60	3.53	0.61
I have insufficient funds for supplies and equipment	4.33	0.91	3.11	1.10
I see my students working to have a better future	4.32	0.82	3.00	0.58
I receive positive feedback from my students	4.32	0.75	3.06	0.64
Job tasks that I am doing are already familiar to me	4.26	0.73	3.53	0.77
My students show pride in their accomplishments	4.26	0.65	3.63	0.68
My students participate in vocational club activities (FFA)	4.26	0.56	3.58	0.61
I receive positive feedback from my peers	4.22	0.73	3.68	1.00
Local businesses provide support for my program	4.21	0.63	3.74	0.65
I have obtained the goals that I set for myself	4.16	0.96	3.42	0.61
My program is misunderstood by others; such as parents, students, counselors, and/or administrators.	4.11	0.99	3.47	0.90
I receive expressions of gratitude from my students	4.11	0.81	2.84	0.69
My students display a lack of self-discipline	4.05	0.78	3.37	0.83
I have inadequate facilities (classroom, lab, etc.)	4.00	1.25	3.53	1.07
I am taking classes to further my education	4.00	1.14	3.56	0.98
My home life is negatively affected because of my school work	3.95	1.39	3.00	1.11
I have inadequate curriculum materials	3.89	1.45	2.84	1.12
I have had success using new teaching approaches	3.84	0.96	3.63	0.60
I have to do recruitment activities for my program	3.84	0.96	3.11	0.99
My students act unmotivated towards my subject area	3.84	0.76	3.32	0.67
I have inadequate equipment	3.79	1.13	3.58	0.96
My class sizes are not appropriate for my subject	3.74	1.24	2.58	1.07
I receive help from my state vocational supervisor	3.63	1.21	2.74	0.99
I receive help from my local vocational supervisor/director	3.28	1.36	2.44	1.15
I have trouble making and sequencing lesson plans	3.28	1.36	2.26	0.81
I run into problems because my administrator does not give clear job expectations	3.11	1.45	1.84	0.96

(table continues)

Events	Impact[2]		Frequency[2]	
	M	SD	M	SD
I experience problems because I don't understand school policies or procedures	3.11	1.41	2.26	0.87
I run into problems because of my poor organizational skills	3.00	1.56	2.26	0.87
I am compared to the former teacher in this program	2.94	1.43	3.47	1.43

Note: [1] Impact Scale: 1 = None, 2 = Minor, 3 = Moderate, 4 = Major, 5 = Critical.
[2] Frequency Scale: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Always.

The data in Table 2 show that 7 of the 39 events experienced by the beginning teachers were perceived to have a critical impact (mean impact rating=4.50 and above) on their teaching. A comparison of the two columns of data shows that all seven items rated as critical were also among the most frequently reported. All seven of the items rated as critical were also rated as occurring often (mean frequency rating = 3.50 and above). 'I feel in control of my program', which occurred often (M=3.63, SD=0.68) had a critical impact (M=4.79, SD=0.42) on their experience. Other events that occurred often that had a critical impact included 'students act with respect towards me' (M=4.74; SD=0.56), 'I feel self confident in my classroom teaching' (M=4.74, SD=0.45), 'I experience satisfaction when an activity succeeds' (M=4.68, SD=.48), 'I see my students succeeding in my class' (M=4.68; SD=48), 'my principal supports me (M=4.63; SD=0.60)', and 'I have more work to do than I have time to do it' (M=4.53; SD=0.70). Twenty-six of the 39 events were perceived to have a major impact (mean score = 3.50 – 4.49) on their teaching. Twelve of those events were reported to occur often (mean frequency rating = 3.50 or above) and fourteen were reported to occur occasionally (mean frequency rating = 2.50 – 3.49).

As shown by the data in Table 2, fifteen events happened on an occasional basis (mean score of 2.50-3.49). Even though they occurred on an occasional basis, all events were perceived to have a major impact (mean score of 3.50-4.49) with the exception of 'being compared to the former teacher', which had a moderate impact. The five events that occasionally happened the least and had a major impact on the beginning teachers were 'receiving feedback from my principal', 'having inadequate curriculum materials', 'receiving gratitude from my students', 'receiving help from my state vocational supervisor', and 'inappropriate class sizes for my subject'.

Objective 4 Describe the perceptions of the beginning agricultural education teachers relating to their levels of stress, satisfaction with their jobs and mentoring assistance provided by local school district personnel.

The teachers responded to their levels of satisfaction and stress by circling numbers of responses on seven point Likert-like scales. The mean score of 4.00 (SD=1.67) on the satisfaction scale (0=very unsatisfied and 7=very satisfied) indicates the beginning teachers were moderately satisfied with their teaching experience after the first seven to eight weeks of the fall term. The mean score of 5.47 (SD=.77) on the seven point Likert-like stress scale (0=low stress and 7=very high stress) indicated their perceived level of stress was high. Fifty-three percent (n=10) of the beginning teachers planned to remain in their current teaching position next year, 47% (n=9) stated they expected to do something else other than be teaching at another school.

Thirty-seven percent (n=7) of the beginning agricultural education teachers reported they were involved in a beginning teacher assistance program sponsored by their local school district. Of the seven teachers who reported being involved in a local mentoring program, six indicated that they were assigned a local teacher mentor, and four reported that they attended scheduled seminars or workshops for beginning teachers.

Conclusions

Findings from this study provided the researchers with the information for formulating the following conclusions:

1. There was a greater share of female than male beginning agricultural education teachers (58% female and 42% male) in the Minnesota teacher induction program. This ratio is different than proportion of males and females participants of the Heath-Camp et al. (1992) study which involved a sample of 49 percent female and 51 percent males.
2. Beginning agricultural education teachers enrolled in the teacher induction program were more likely to teach students in grades 10 – 12 than in grades 7 – 9. This reflects that fact that most secondary agricultural education programs where the beginning agricultural education teachers are employed are located in high schools that house grades 10-12.
3. The vast majority of the beginning agricultural education teachers taught courses in the area of their teaching licensure. Minnesota teachers are only allowed to teach in their area of teacher licensure unless a temporary variance is warranted for having them teach outside of their area.
4. The beginning teachers worked more than a forty hour week during the first seven to eight weeks of the 1999-2000 school year in order to complete their classroom and laboratory teaching, supervised agricultural experience program supervision, FFA advising and coaching, and other school-related tasks. The amount of time reported for teaching in-school students was similar to the amount of time planning lessons and grading papers.
5. The forms of assistance provided by local school district personnel that had the highest perceived impact on the beginning agricultural education teachers included parental support, availability of materials and textbooks, planning time, curriculum guides for the program, principal feedback, clerical support and mentor teachers. The order of these findings is almost identical to the order of assistance preferred by the vocational education teachers who participated in the Heath-Camp et al. (1992) study.
6. Though it seldom occurred, beginning agricultural education teachers believe that having an extra planning period would have a major impact on their teaching experience. Respondents in the Heath-Camp et al. (1992) study concurred that this allowance is needed for all beginning career and technical education teachers.
7. Events perceived as having a major impact on the teaching experience of beginning agricultural education teachers were related to control, student respect, self-confidence, personal, satisfaction, student success, support from the principal, and the amount of their workload.
8. The beginning agricultural educations teachers were experiencing a high level of stress during the first 7-8 weeks of the school year. The level of stress reported by participants

of the Heath-Camp et al. (1992) study was lower and may be partially attributed to the fact that they completed the assessment after more weeks of teaching.

9. The beginning teachers were experiencing a moderate amount of job satisfaction at the time they completed the questionnaire. This may be due in part to still becoming acquainted with their roles and responsibilities as a teacher and FFA advisor.
10. The proportion of the beginning agricultural education teachers enrolled in a beginning teacher assistance program sponsored by their local school district was low compared to what most beginning teachers from across the United States are experiencing. Thirty seven percent of the beginning agriculture teachers in this study were involved in a beginning teacher assistance program sponsored by their local school district. This is higher than the 25% reported by Heath-Camp et al. (1992), but lower than the 65% reported by the U.S. Department of Education (1999).

Recommendations

Based upon the findings and conclusions of this study, the researchers offer the following recommendations for research and practice. First of all, school district personnel responsible for staff development need to take appropriate measures to respond to the forms of assistance that are perceived to have a major or critical impact on the beginning agricultural educators (e.g., parental support for the program; adequate materials, textbooks, and workbooks are provided; planning time available; curricula guides available for the program; feedback from the principal, etc.). Second, district personnel need to be aware of the frequency and impact of the teaching events of the beginning agricultural education teacher(s) and provide interventions that properly affect the desired levels of performance, job satisfaction, and stress. Third, due to the elevated levels of stress and dissatisfaction with the job during the early stage of the teaching year, the perceptions of the beginning agricultural education teachers need to be monitored and responded to in an appropriate manner on a systematic and regular basis.

Researchers need to continue to explore how the nature, impact, and occurrence of desired forms of assistance and the events experienced by beginning teachers of agricultural education differ or remain the same with additional cohorts of agricultural education teachers. Researchers also need to explore the relationship between job stress, satisfaction, and the impact and occurrence of selected forms of assistance and the teaching events experienced by the beginning agricultural education teachers. And finally, concurrent with these efforts, researchers need to determine if the nature and scope of the forms of assistance and events change as the beginning agricultural education teachers progress through the steps of various models of the induction process (Furlong and Maynard, 1995; Waters, 1988; Ryan, 1986).

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A Description of the Nature and Impact of Teaching Events and Alternate Forms of Beginning Teacher Assistance Experienced by Beginning Minnesota Agricultural Education Teachers

A Critique

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The recruitment and retention of teachers of agriculture is a national problem. Joerger and Boettcher studied beginning agriculture teachers in Minnesota in an effort to categorize their experiences and support networks. They provided a conceptual framework focused on issues facing beginning teachers as well as notions of teacher development. The Theoretical Framework section was well written, but could have been enhanced with some changes in organization such as a few sub-headings and careful placement of information related to all teachers vs. agriculture teachers. This organization would have helped with the flow of material. The authors also clearly outline the significance of the study and set the stage well for the presentation of the purpose and objectives.

The purpose and procedures of the study were well written. It would have been helpful to know why the authors selected the Heath-Camp and Camp instrument for their study, and whether other similar instruments were reviewed for suitability, if available. It is assumed, though not stated, that a pilot study was not necessary given the prior use and fairly high reliability of the instrument. It is also assumed that all 19 participants completed and returned their surveys as no information about follow-up contacts is provided on those individuals who received surveys via mail. Providing this information would have eliminated the need for making assumptions by the reader.

The Findings section provides detailed information about the survey data analysis. The authors do a good job of summarizing tabular data so that it is not repeated in the narrative text; however, more information of an analysis nature would have enhanced this section. The same can be said for the Conclusions, which adequately list those drawn from the data analysis, but could provide a more in-depth discussion of implications of the results. There is no indication whether the 19 participants represent all of the beginning agriculture teachers in Minnesota and, if they do not, the conclusions and recommendations are possibly generalized too much beyond the study participants. Some questions arise from looking at the items listed in the tables:

- Participants indicated that principals provided helpful evaluation and feedback. What do they view as helpful? Are they all in agreement with this? Do they differ based on any characteristic or school factor?
- What kinds of things were presented in the new teacher workshops? Again, did these items differ by school, region, etc.?

There are more questions that could be asked, and I am doing so to prompt the authors to consider conducting some follow-up interviews to investigate, in detail, some of these factors.

In summary, Joerger and Boettcher conducted a timely study with many implications for the field. It was interesting to read, and was well-written.

Land Grant University Faculties' Perceptions of Teaching Skills and Educational Technologies

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Abstract

Faculty members with teaching appointments in the College of Agriculture and Life Sciences (CALS) and the College of Education (COE) at Mississippi State University were studied to determine their perceived levels of skill and interest to learn more about selected educational technologies and teaching methods. The study was conducted as part of a United States Department of Agriculture Challenge Grant in conjunction with the University of Arkansas. To expand upon the study by Wardlow and Johnson (1999), Mississippi State University faculty from the College of Education were studied and compared to faculty from the College of Agriculture and Life Science. As expected, faculty rated themselves higher in the traditional methods of instruction than they did in the new and emerging educational technologies. However, a strong level of interest was apparent in their desire to learn more about educational technologies. Differences were noted between COE and CALS faculty in several areas, most notably in "student centered activities." Also noted were similarities between the two faculties in the areas of "developing a teaching portfolio," and "case studies." A positive correlation was found between the variable "have received formal instruction in pedagogy" and the interest to learn more about "interactive technology based instruction." However, COE and CALS faculty members reported being discouraged from learning more about educational technologies because of a lack of administrative support and/or equipment. Respondents opined that "research facilitates advancement" and is looked upon more favorably by university administrators. Compounding the problem is that most faculty members have not received formal training in the use of educational technologies in the classroom.

Introduction

"Access to information technology (IT) and the Internet and the ability to use this technology effectively are becoming increasingly important to full participation in America's economic, political and social life. While computer and Internet access has exploded in recent years, America faces a 'digital divide'-- a gap between those who have access to Information Age tools and the skills to use them and those who don't" (Clinton, 2000, Online). On April 4, 2000, President Clinton issued a National Call to Action for turning the digital divide into a digital opportunity. Clinton established an initiative whereby technology is being used to bring people together, for the sake of using IT to help make the American dream a reality for more people, regardless of race, income, education level, geography, or disability. Clinton's initiative is based on two goals: 21st century learning tools for every child in every school, and digital opportunity for every American family and community.

A plan for achieving the first goal has been implemented. The idea is that for children to succeed in life, they need to master basic IT skills at an early age. A critical element in this supposition is for an assumed level of knowledge regarding IT literacy. To achieve this IT knowledge level, focus is being placed on a comprehensive approach to integrating technology into teaching and learning while recognizing that—as powerful as technology is—it is no substitute for an inspiring teacher or a loving parent (Clinton, 2000). One measure for achieving Clinton's first digital divide goal is to "ensure that teachers are technologically literate and can integrate technology into the curriculum." How can the American public be assured that teachers, both current and future, have received an appropriate training in IT at the university level? What is the current level of IT skills for college of agriculture faculty? What is the current level of IT skills for college of education faculty?

The development and use of IT is certain to bring about change in education. Moore and Thompson (1990) found that many states were in the process of installing telecommunications technology to allow distance education to occur in all levels of education, cradle to grave (Murphy & Terry, 1998). The use of educational technologies such as computers and telecommunications offers great potential for improving the delivery of already high quality instructional programs (McCaslin & Torres, 1992; Day, Raven, & Newman, 1998). As noted in other land grant university studies (Kirby, Waldvogel, & Overton, 1998; Wardlow & Johnson, 1999), university faculty had much interest in learning about current educational technologies such as using multimedia, constructing web pages, and incorporating computer-aided materials into their curricula. These studies, and Clinton's National Call to Action, assumed that interest in IT alone could transform teachers into IT teachers at all levels. If this is true, then what variables might be associated with university faculties' IT use in the classroom? Does IT create enough interest among faculty to learn more about it?

Teaching skills and/or the interest to improve those skills among university faculty has enjoyed a renewed interest in the public eye over the past five years. Wiedmer (1994, cited in Wardlow & Johnson, 1999) found that 96% of the students from 17 universities believed that teaching was the most important job of the professor, followed by service, then research. While some might argue the merit of this finding, all believers of the land grant university model will agree that teaching, research, and service are the cornerstones of a highly successful educational model. Land grant faculties vary in number and specialization, just as they do in their preparation for "teaching" at the university level. While faculty in Colleges of Education have experienced a formalized education in pedagogy prior to their collective university-level teaching duties, the same cannot be said of all faculty members in most Colleges of Agriculture. Does the presence of formal pedagogical training influence faculty members' perceived levels of teaching skill and/or skill in using educational technologies?

A 1999 report from the U. S. Department of Education (CEO Forum, 2000) found that only 24% of new teachers felt "very well prepared" to integrate technology into their curriculum. How do we ensure Americans that future public school teachers will be IT literate? One method of addressing this concern is to conduct a needs assessment of land grant faculties' teaching skills and interests in improving their teaching techniques. Also, to address President Clinton's National Call to Action, a study of teacher educators' IT skill levels and interests must be ascertained.

Purpose and Objectives

The purpose was to determine College of Agriculture and Life Sciences (CALS) and College of Education (COE) faculty members' perceived levels of teaching skill and educational technology use, and their interest levels for improving those skills. The study focused on teaching methodology and techniques along with the implementation and use of technology in the classroom. This study was conducted as part of a USDA Challenge Grant in association with the University of Arkansas. This study was guided by the following research questions:

1. What are faculty members' perceived levels of teaching skill, and are there differences in the perceived levels between CALS and COE faculty?
2. What are faculty members' levels of interest for learning more about teaching activities, and are there differences in those levels between CALS and COE faculty?
3. What are faculty members' perceived levels of skill in using education technologies, and are there differences in the perceived levels between CALS and COE faculty?
4. What are faculty members' levels of interest for learning more about educational technologies, and are there differences in those levels between CALS and COE faculty?
5. What is the relationship between faculty members' perceived levels of skill and interest in learning more about both teaching activities and educational technologies?
6. What are the relationships between the faculty members' level of interest in learning more about teaching activities and technologies and their related demographics, such as the existence of having received formalized instruction in pedagogy?

Procedures

A census study was conducted of CALS and COE teaching faculty at Mississippi State University. A list of all current CALS and COE faculty members was obtained from each respective dean's office. Individuals were selected for the survey on the basis of having taught at least one course within the previous two years. A total of 181 faculty members were identified and included in the study.

Following survey research guidelines, completed surveys were returned from 118 faculty members (COE=48, CALS=70) after three instrument mailings (plus two additional reminder mailings between each instrument mailing) for an overall response rate of 65.19%. Responses were received from all departments in both colleges. In an attempt to control the non-respondent error, a double-dip random sample of 20% (n=13) of the non-respondents was taken and telephonic data collection occurred using the research instrument as an interview guide (Miller & Smith, 1983). Results from the double-dip sample were compared to the respondent sample. No statistical differences were found, thus the findings may be generalized to the entire population of CALS and COE teaching faculty at Mississippi State University.

Data were collected using a survey instrument based on the work of Wardlow and Johnson (1999), which contained two specific categories: **teaching activities** (20 items) and **educational technologies** (12 items). These two categories were split between three instrument sections: common teaching methods and techniques, teaching technologies, and general teaching factors. The instrument also included five questions pertaining to the respondents' teaching appointment and experience.

Section I required the respondents to rate their "current level of skill" (Excellent, Good, Fair, Poor) and "level of interest to learn more" (High, Moderate, Low, None) for nine specific teaching methods such as lecture, demonstration, case studies, etc. The second section asked respondents to use the same scales in rating their skill and interest levels for teaching technologies such as digital cameras, videoconferencing, Internet course web pages, etc. Section III allowed respondents to use the same scales mentioned above to rate their skill and interest levels for general teaching factors such as preparing course syllabi, encouraging critical thinking, faculty peer observations, etc. Section III contained items for both categories, teaching activities and educational technologies, which were combined with the items found in Sections II and I. The instrument had been reviewed for construct validity previously and received a coefficient of stability of $\underline{r} = .68$ (Wardlow & Johnson, 1999). For this research study, the instrument was tested and revealed an overall coefficient alpha of reliability estimate of .94.

Descriptive statistics and bivariate analyses were used to describe the data. Relationships were explored using Spearman's correlation coefficients. Davis' (1971) convention was used to describe the magnitude of relationships.

Findings

Analyses of the data showed a mean of 13.7 years of university teaching experience for all subjects (Table1). The teaching appointment mean was 51.14% time with 5.63 graduate hours taught per year and 7.97 undergraduate hours taught per year. Graduate class size was 15 students per course, while undergraduate courses averaged 25 students per class.

Table 1.
Respondents' Teaching-Related Demographic Characteristics (N=181)

Characteristic	n	M	SD
Current FTE teaching assignment (% of time)	112	51.14	30.66
Number of years teaching at collegiate level	117	13.71	9.43
Number of graduate credit hours taught per year	103	5.63	6.15
Number of undergraduate credit hours taught per year	112	7.97	8.27
Average class size - Graduate courses	84	15.21	10.98
Average class size – Undergraduate courses	113	25.44	23.84

Question 1.

When asked to assess their current level of skill for 20 teaching activity items, no item was rated with an overall mean of "excellent" ($\underline{M} \geq 3.50$). CALS and COE faculty members rated nineteen items as "good" ($\underline{M}$ = 3.49—2.50) and only one item, "Developing a teaching portfolio" had a mean score of "fair" (Table 2). Statistical differences were noted in 11 items, but only two real differences materialized on a practical basis. These differences were discovered in

"Motivating students/creating interest" and "Developing a teaching portfolio." COE faculty perceived their skills for motivating students as excellent, while CALS faculty perceived their skills for motivating students as good. For the second practical difference, COE faculty rated their skill levels as good compared to CALS faculty who considered their skill levels as fair in developing a teaching portfolio.

Table 2.
Respondents' Level of Skill in Teaching Activities (N=181)

	Grand (n=118)		COE (n=48)		CALS (n=70)		
Teaching Activity	M[a]	SD	M	SD	M	SD	F
Preparing course syllabi	3.35	.63	3.46	.65	3.27	.61	2.52
Lecture	3.33	.66	3.38	.71	3.29	.62	0.56
Demonstration	3.29	.65	3.43	.62	3.19	.65	3.98*
Hands-on exercises and activities	3.26	.73	3.46	.66	3.13	.75	5.79*
Preparing instructional materials	3.25	.68	3.27	.74	3.24	.65	0.05
Motivating students / creating interest	3.24	.66	3.50	.58	3.06	.66	14.15*
Designing / revising a course	3.23	.66	3.33	.66	3.16	.65	2.05
Preparing effective lesson plans	3.14	.74	3.33	.78	3.01	.69	5.45*
Discussion-based instruction	3.11	.68	3.43	.62	2.90	.65	19.33*
Hands-on problem-solving activities	3.06	.76	3.19	.77	2.97	.75	2.35
Encouraging critical thinking	3.06	.70	3.23	.66	2.94	.70	4.99*
Evaluating student learning	3.05	.68	3.15	.74	2.99	.63	1.60
Evaluating my teaching	2.92	.78	3.08	.74	2.80	.79	3.85*
Cooperative learning (group projects)	2.83	.81	3.17	.79	2.59	.74	16.34*
Improving student reading / writing	2.82	.82	2.94	.89	2.73	.75	1.75
Learning about alternative teaching methods	2.77	.76	2.91	.86	2.67	.68	2.84
Discovery learning activities	2.73	.80	3.02	.77	2.52	.75	11.55*
Case studies	2.67	.91	2.93	.84	2.49	.93	6.57*
Faculty peer observation	2.61	.84	2.76	.86	2.51	.82	2.30
Developing a teaching portfolio	2.46	.88	2.74	.91	2.28	.82	8.12*

[a] Excellent = 4, Good = 3, Fair = 2, Poor = 1
*p<.05

Question 2.

Respondents rated their perceived level of interest in learning more about the selected teaching activities (Table 3). As a group, COE and CALS faculty had at least a moderate interest ($\underline{M} \geq 2.50$) in learning more about all of the selected teaching activities (high = 4, moderate = 3, low = 2, none = 1). Statistical differences were noted in four of the items, but practical differences resulted for one item only. COE faculty had a moderate interest ($\underline{M} = 3.21$) in learning more about "Developing a teaching portfolio" while CALS faculty had only a low level of interest (M = 2.38) to learn more about portfolios.

Table 3.
Respondents' Level of Interest to Learn More About Teaching Activities (N=181)

	Grand (n=118)		COE (n=48)		CALS (n=70)		
Teaching Activity	M[a]	SD	M	SD	M	SD	F
Encouraging critical thinking	3.28	.91	3.42	.90	3.19	.92	1.83
Motivating students / creating interest	3.25	.92	3.29	.87	3.23	.95	.13
Hands-on problem-solving activities	3.23	.90	3.35	.85	3.14	.93	1.41
Learning about alternative teaching methods	3.15	.93	3.29	.97	3.04	.89	2.03
Evaluating my teaching	3.15	.92	3.38	.89	3.00	.92	4.81*
Evaluating student learning	3.11	.90	3.25	.86	3.01	.92	1.96
Improving student reading / writing	3.10	.98	3.15	1.02	3.06	.95	.23
Hands-on exercises and activities	3.09	.87	3.18	.83	3.03	.90	.78
Demonstration	3.04	.92	3.21	.81	2.91	.98	3.03
Discovery learning activities	3.04	.94	3.20	.96	2.92	.92	2.28
Lecture	2.97	.97	3.04	.94	2.91	1.00	.49
Discussion-based instruction	2.97	.90	3.07	.91	2.90	.89	.94
Cooperative learning (group projects)	2.96	.92	3.11	.98	2.87	.87	1.89
Preparing instructional materials	2.91	.93	3.00	.99	2.86	.90	.66
Faculty peer observation	2.91	.92	3.18	.87	2.71	.91	7.13*
Case studies	2.88	.95	3.21	.83	2.68	.97	8.86*
Preparing effective lesson plans	2.83	.99	2.94	1.02	2.75	.96	.99
Designing / revising a course	2.82	.90	2.96	.92	2.72	.88	1.98
Developing a teaching portfolio	2.72	1.03	3.21	.98	2.38	.93	21.25*
Preparing course syllabi	2.59	.98	2.71	1.05	2.51	.92	1.21

[a] High = 4, Moderate = 3, Low = 2, None = 1
*p<.05

Question 3.

Respondents rated their perceived level of skill in using 12 different educational technologies (Table 4). As a group, COE and CALS faculty rated their skills as good (M = 2.75) to fair (M = 1.61), but only two items had a grand mean of 2.50 or higher. Two factors revealed statistical and practical differences. CALS faculty rated their skill levels as good (M = 2.91, 2.67 respectively) in the use of "Presentation Graphics (ex: PowerPoint)" and "Computer projection systems," while COE faculty rated their skill levels as fair (M = 2.49, 2.24 respectively) for these same educational technologies.

Table 4.
Respondents' Level of Skill in Using Educational Technologies (N=181)

	Grand (n=118)		COE (n=48)		CALS (n=70)		
Educational Technologies	M[a]	SD	M	SD	M	SD	F
Presentation graphics (ex: PowerPoint)	2.75	1.05	2.49	1.08	2.91	1.00	4.64*
Computer projection systems	2.50	1.00	2.24	.96	2.67	1.00	5.14*
Digital cameras (still cameras)	2.31	1.05	2.09	1.00	2.46	1.06	3.47
Interactive technology based instruction	2.28	.93	2.43	1.06	2.17	.82	2.07
Document or image scanners	2.25	1.07	2.13	1.01	2.33	1.11	.90
Computer multi-media materials	2.21	.95	2.13	.92	2.26	.97	.46
Digital video cameras	1.89	.96	1.80	.92	1.94	.99	.60
Internet course web pages	1.86	.93	1.70	.91	1.97	.93	2.40
Teaching via distance education	1.86	.89	2.00	1.02	1.76	.77	1.93
Videoconferencing technology	1.67	.83	1.78	.88	1.60	.81	1.24
Internet course discussion groups	1.64	.76	1.72	.77	1.59	.75	.92
Teaching via interactive video	1.61	.83	1.77	1.03	1.51	.66	2.75

[a] Excellent = 4, Good = 3, Fair = 2, Poor = 1
*p<.05

Question 4.

Table 5 illustrates respondents' level of interest to learn more about educational technologies. COE and CALS faculties were moderately interested in learning more about all educational technologies. All item means were contained within the narrow range of 2.83 to 3.43. Statistical differences were found in all educational technologies but one, "Internet course web pages." However, the only practical differences occurred in the items "Interactive technology based instruction" and "Computer multi-media materials." For both items, COE faculty members were highly interested in learning more about these educational technologies (M = 3.76, 3.50 respectively) while CALS faculty members were only moderately interested (M = 3.22, 3.06 respectively) in learning more about these same technologies.

Table 5.
Respondents' Level of Interest to Learn More About Educational Technologies (N=181)

	Grand		COE		CALS		
	(n=118)		(n=48)		(n=70)		
Educational Technologies	M^a	SD	M	SD	M	SD	F
Interactive technology based instruction	3.43	.83	3.76	.57	3.22	.91	12.61*
Internet course web pages	3.35	.85	3.52	.77	3.23	.89	3.30
Computer multi-media materials	3.23	.94	3.50	.86	3.06	.95	6.40*
Computer projection systems	3.17	.90	3.48	.72	2.96	.95	10.07*
Digital video cameras	3.11	.98	3.40	.91	2.93	.99	6.58*
Digital cameras (still cameras)	3.09	1.00	3.33	.92	2.93	1.02	4.56*
Presentation graphics (ex: PowerPoint)	3.04	.99	3.38	.89	2.81	1.00	9.63*
Document or image scanners	3.03	.96	3.33	.87	2.83	.97	7.95*
Videoconferencing technology	2.96	1.00	3.35	.79	2.70	1.05	12.87*
Internet course discussion groups	2.91	1.00	3.15	.92	2.74	1.02	4.82*
Teaching via interactive video	2.89	1.04	3.15	.97	2.71	1.07	5.03*
Teaching via distance education	2.83	1.03	3.06	.96	2.68	1.06	4.00*

^{a}High = 4, Moderate = 3, Low = 2, None = 1
*$p<.05$

Question 5.

Respondents' perceived levels of skill and levels of interest to learn more about teaching activities were correlated to determine if significant associations were evident for COE and CALS faculty members. Davis' conventions (1971) were used to describe the magnitude of the relationships. Two specific teaching activities, "Case studies" and "Developing a teaching portfolio," produced low positive relationships (r = .20 and .19 respectively); two more activities, "Designing/revising a course" and "Preparing effective lesson plans," produced low negative relationships (r = -.24 and -.23 respectively).

In similar fashion, respondents' perceived levels of skill and interest to learn more about educational technologies were correlated to determine if significant associations existed for COE and CALS faculty members. Two educational technologies, "Interactive technology based instruction" and "Videoconferencing technology," produced low positive relationships (r = .19 and .22 respectively); three more technologies, "Computer projection systems," "Presentation graphics," and "Document or image scanners," produced low negative relationships (r = -.21, -.24 and -.25 respectively).

Question 6.

Selected teaching-related demographics were correlated with the level of interest in learning more about teaching activities and educational technologies. Due to the nature of the data in this study, Spearman correlation coefficients were calculated for all items. Twenty-nine significant relationships (both positive and negative) resulted in COE and CALS faculty members' desire to learn more about teaching activities and educational technologies and their teaching related demographics. For practical purposes, only the relationships of moderate magnitude were considered for further examination. A positive correlation ($\underline{r}$ = .30) resulted between the variable "have received formal instruction in pedagogy" and interest to learn more about "Interactive technology based instruction."

Conclusions

Mississippi State University teaching faculty from the College of Agriculture and Life Sciences and the College of Education provided the responses for this study. The average amount of respondents' teaching experience was just under 14 years. COE and CALS faculty members devoted about 51% of their time annually to teaching eight credit hours of undergraduate instruction, and six credit hours of graduate instruction. It was interesting to note that while respondents were moderately interested in learning more about teaching activities and educational technologies, most were of the opinion that "research facilitates advancement" and is looked upon more favorably by university administrators. One respondent noted,

> *I care very much about my teaching and the quality of my teaching. I am frustrated by the "double speak" I hear from the upper administration. We get messages like we teach too much. Teaching doesn't matter; research and getting grant funding is what facilitates promotion. In the next breath we are filling out surveys such as this and documenting retention of students while being given poor facilities, poor equipment, and no budget.*

Teaching activities

Faculty members rated their perceived level of skill in 20 items relating to teaching activities. Overall, respondents from both colleges rated their skill levels in traditional teaching activities as "good." This was true also when comparing the two colleges independently. In terms of current skill level, teaching methods such as preparing syllabi, lecture, demonstration, and hands-on activities were consistently ranked near the top for each college. On the other hand, items such as developing a teaching portfolio, faculty peer observation, case studies, and discovery learning activities were consistently ranked near the bottom for both faculty groups. It is possible that these items reflect less traditional areas for educators who have been teaching for more than 10 years. These findings are in agreement with the results found by Wardlow and Johnson (1999) for College of Agriculture faculty at the University of Arkansas.

Both studies revealed faculty strengths in the traditional teaching methods, while underscoring the need to further develop newer teaching methodologies that provide for greater student participation in the learning process. If faculty members value the learning process and the relevance of student interaction in that process, then COE and CALS faculty members would be wise to further explore "student-centered" instructional methods. As noted by Somekh and Davis (1997), traditional classroom teaching methods have always created a dilemma for conscientious instructors; what is possible for the group may not be ideal for the individual. It is unlikely that each student in the classroom has identical learning needs or preferred learning styles.

College of Education faculty members rated all teaching activity skill areas as good, and one area as excellent. COE faculty perceived their greatest skill was in motivating students and creating interest in the classroom. The converse shows their weakest skill area was in developing a teaching portfolio. College of Agriculture and Life Science faculty perceived their highest skill level was in using the lecture method. CALS faculty rated their skills as fair for developing a teaching portfolio. The results indicate that both faculty groups might want to request in-service workshops for developing a teaching portfolio, if this is a needed skill area for university faculty members. Further study might determine whether faculty members at many universities value the teaching portfolio as a realistic portrayal of an educator's skills and abilities.

When faculty rated their level of interest to learn more about teaching activities, one expected outcome occurred. The expected outcome was found in the highest rated item for skill level "Preparing course syllabi," which also received the lowest rated level of interest to learn more. COE and CALS faculty were only moderately interested in learning more about all 20 teaching activities. The upside was that CALS respondents were most interested in learning more about "Motivating students/creating interest," which demonstrates the need for engaging students in the learning process. Wardlow and Johnson (1999) found similar results for University of Arkansas faculty, with the exception that Mississippi State University faculty were not as interested in learning more about the lecture and demonstration methods, as was found in the Arkansas study.

Significant relationships, although low in magnitude, resulted in COE and CALS faculty members' skill levels and levels of interest to learn more about "Case studies" and "Developing a teaching portfolio." As respondents' skill levels changed (increase or decrease), so too did their desire to learn more about these two teaching methods. The converse held true for two additional teaching methods, "Designing/revising a course" and "Preparing effective lesson plans." As respondents' skill levels changed, their desire to learn more about these two items changed in the opposite direction.

Educational technologies

Respondents' level of skill in using educational technologies was considerably lower than their level of skill in teaching activities. Faculty members rated themselves most proficient in older technologies such as PowerPoint, projection systems, and still digital cameras. Newer and somewhat emerging technologies such as teaching via interactive video and Internet discussion groups resulted in the greatest deficiencies. As was found in the study by Wardlow and Johnson (1999), faculty from both universities had a high level of interest to learn more about all these technologies, not just the emerging technologies.

The highest rated item for desire to learn more about was the use of interactive technology based instruction. This result shows promise for promoting more student-centered instruction at the university level. Computer-assisted instruction can be designed to accommodate individual learner diversities by combining a mix of text and media, and can be accessed by learners individually or in small groups. These materials are more student-centered than teacher-centered, and may better meet the learning needs of the individual (Brooks, 1997).

Again, a phenomenon occurred when respondents' rated their level of interest in learning more about educational technologies. A low level of interest was given for learning to teach via interactive video, even though respondents also rated this item as their weakest skill area. This result may indicate one of two possibilities; either respondents considered themselves unskilled in using interactive video and did not want to improve upon it, or the question may have been misleading to the respondents. Further study of university faculty members' skills on a longitudinal basis may provide clarity in understanding this phenomenon.

COE and CALS faculty members' desire to learn more about teaching activities and educational technologies were correlated with their teaching-related demographics. Individuals who had received formal training in pedagogy held a significantly stronger desire to learn more about "Interactive technology based instruction," than did respondents without formalized training in pedagogy. Although one might argue this is an expected result without consequence, these researchers believe it alone distinguishes the need for further study and professional development activities in the use of educational technologies. To dismiss this finding might promulgate the use of educational technologies in lieu of sound instructional design. All educators would be well advised to heed the warning of Bernstein (1998), who found that many computer-assisted instructional materials (CAI) are developed by technical professionals who have the critical technical skills necessary for successful implementation, but lack knowledge of educational principles. The resulting CAI are technology-driven rather than pedagogy-driven.

Respondents in this study were competent and reasonably proficient in all teaching activities. A concern may arise for the deficiencies found in the less traditional teaching methods. A real concern was found in the use of educational technologies. Most respondents have not had formal instruction in using these technologies, and have had to learn how to use them through "the seat of their pants" approach. While some instructional workshops in educational technologies are currently in place, many respondents noted, "Classes are to short to learn the ropes." Another concern expressed by most of the faculty is that university administrators do support integrating technology into the classroom, but "there is very little equipment available." Also, that "department heads do not favor faculty training," and any new innovative teaching strategies "have to be funded by faculty," not the department or the university.

Recommendations

Based upon the findings of this research, it is apparent that faculty are interested in the integration and use of information technology in the classroom. The problem arises from a lack of administrative support and/or equipment. Compounding this problem is most faculty members have not received formal training in the use of educational technologies. Although professional development workshops addressing these factors is in place and is widely attended by many COE and CALS faculty, respondents in this study were unaware of such services. Why is there a discrepancy in the knowledge base for IT services at Mississippi State University? What are the barriers to attending and maintaining a professional development program to learn more about current teaching methods and educational technologies?

Future workshops should be developed to address specific teaching methodologies and educational technology use in the classroom, especially distance learning activities. Specifically, faculty members are most interested in learning how to motivate students, encourage critical thinking, use interactive technology based instruction, develop Internet course web pages, and incorporate computer multimedia materials in the teaching and learning process.

The results of this study show that certain faculty members in the Colleges of Agriculture and Education at Mississippi State University have much to learn before they can answer Clinton's National Call to Action for turning the digital divide into a digital opportunity. To create knowledgeable, IT literate students, it is of the utmost importance that "inspiring teachers" and "inspiring teacher educators" become IT literate too.

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Land Grant University Faculties' Perceptions of Teaching Skills and Educational Technologies

A Critique

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Contribution and Significance of Research

This research with the faculties of the College of Agriculture and Life Sciences and the College of Education at Mississippi State University, along with similar and recent research conducted by Wardlow and Johnson with faculty of the College of Agriculture at the University of Arkansas, and with similar results for both institutions, strengthens the case for and illustrates the need to help faculty to learn to use, and thus become more comfortable with, both educational information technologies and selected teaching activities. The research makes a significant contribution to understanding better the self-perceived perceptions of educational technologies and teaching skills held by university faculty members.

Also, because interactive technology-based instruction will become more prevalent in the future, especially as more instruction is delivered in asynchronous modes, the finding that "individuals who had received formal training in pedagogy held a significantly stronger desire to learn more about 'interactive technology-based instruction' than did respondents without formalized training in pedagogy" indicates a need for in-service training of faculty without formal pedagogical preparation. This finding should be heeded by university administrators. The finding that faculty in both colleges rated their skills in developing teaching portfolios rather low, coupled with the increasing use of teaching portfolios in assessing people for tenure and promotion, indicates another area for in-service education.

The authors are to be commended as well for the way in which they determined perceived interests of the faculty with respect to level of interest in learning more about teaching activities and educational technologies. Consequently, opinions expressed about perceived levels of support and interest from administrators probably would not have surfaced in the way that they did. The resulting findings should be taken into consideration by university administrators when setting policy and program priorities.

Procedural Considerations

The research was designed well around a logically developed theoretical base and conducted in a sound manner. The researchers are to be commended in the way in which they handled the problem of non respondents.

Questions for Consideration

Besides the authors' conclusions drawn and recommendations made, should future researchers examine the degree to which computer-assisted instructional programs available to faculty, e.g., WebCT, are based on ease of use and sound educational principles, and, if necessary, make recommendations for improvement?

Using Think-Aloud Protocols to Compare Cognitive Levels of Students and Professors in College Classrooms

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Abstract

In Bloom's Taxonomy, higher-order thinking is defined as application, analysis, synthesis, and evaluation (Bloom et al., 1956). Since thinking at these levels is an indispensable skill in the learning process and in everyday life, offering students opportunities to practice higher-order thinking during class is necessary.

The Florida Taxonomy of Cognitive Behavior (FTCB), created by Webb (1968), and based upon Bloom's Taxonomy (1956), was used to measure the potential level of cognition professors evoked in students through their various classroom behaviors. Then, from those professors' classes, students were randomly selected to engage in a think-aloud protocol to determine their cognitive level of thought during class. Frequencies were examined between professors' cognitive level of classroom discourse and students' cognitive level of thoughts during class.

Professor's taught 43% of the time at the knowledge level of cognition. However, the most common type of thought displayed by students in class was "random or nonsense thoughts" (68%). The least frequently utilized cognitive levels by professors were application (7%), analysis (7%), synthesis (7%), and evaluation (6%). Students concentrated an average of 4.5% of their thoughts in class at the analysis level, less than 1% at the synthesis level, and an average of 1% at the evaluation level.

Professors need to be aware of cognitive levels of teaching in order to use teaching techniques that develop students' ability to think at higher cognitive levels. On the other hand, students should challenge themselves to "think" during class about applications of the classroom material to their everyday lives.

Introduction

The need to have students graduate with a demonstrated capacity to think at the higher levels of Bloom's Taxonomy is more urgent than ever (Newcomb, 1995). Recently, however, there is concern that college and university students are not learning to their full potential. According to Whittington and Bowman (1994), several major national reports expressed the view that undergraduate education in general is incoherent and ineffective. The apparent foundation for these accusations is failure on the part of educators to challenge students to think. However, using Bloom's Taxonomy (1956) as a basis for examining cognitive levels of thought, it is possible to study both professors and students to determine the validity or lack of validity of these assertions.

Theoretical Framework

Bloom's Taxonomy of the Cognitive Domain

Bloom's Taxonomy of Educational Objectives: Cognitive Domain provides a useful framework for documenting the various cognitive levels at which the brain operates. Bloom's (1956) six-step hierarchical system of thinking moves from the knowledge level, that emphasizes recalling subject matter, to the evaluation level, that entails making judgments (Table 1). Each level is reflected through cognitive activities. Given that learning is enhanced by increasing the percentage of cognitive activity occurring at the higher levels of Bloom's Taxonomy, this framework gives focus and direction to teachers who are looking to improve the quality of learning in their classrooms (Whittington and Bowman, 1994).

Table 1
A Synopsis of Bloom's Hierarchy of Thought

Cognitive Level	Definition	Activity
Knowledge	Recalling subject matter	List, define, label, and match
Comprehension	Learners know information that has been communicated, but cannot apply in other situations	Explain, rewrite, paraphrase, summarize, and give examples
Application	Learners apply information to different situations and learning tasks	Compute, demonstrate, use, predict, discover, and solve
Analysis	Learners separate data into its component parts; these parts are differentiated and related based on their relationship	Differentiate, discriminate, relate, diagram, and distinguish
Synthesis	Combines learned elements to create a new whole; working into pieces and elements, arranging so as to create new forms, patterns, or structures	Create, compose, produce, and develop
Evaluation	Entails making judgment on the value of materials and methods for given purposes	Justify, compare, contrast, evaluate, and interpret

Note. McCormick, D. (1998). Adapted from Bloom et al., (1956).

Think-aloud Protocols

During the 1950's, the cognitive revolution initiated a new era of thinking about thinking by addressing fundamental questions about the human mind and by creating perspectives and tools to pursue the answer to those questions. Think-aloud protocols, the verbal reports produced by subjects who expressed their thoughts while engaging in some activity, has been one of the tools that allowed psychologists to explore previously inaccessible domains of cognitive processing (Kucan and Beck, 1997). Newell and Simon (1972) analyzed think-aloud protocols, and demonstrated how the pieces presented orally completed the cognitive puzzle's vast and empty interior.

Verbal reports were long used as data for psychological research because they provided information as to "what is going on in the mind" (Bowen, 1994). Piaget validated the use of verbal reports when he used them to test hypotheses based on subjects' responses (Abraham and Renner, 1986). Psychologists and researchers have documented think-aloud protocols as a means for collecting verbal reports to analyze human thoughts.

Higher-order Thinking

Higher-order thinking is defined as application, analysis, synthesis and evaluation (Bloom et al., 1956). Thomas (1987) further defined higher-order thinking as the ability to think critically, make ethically and intellectually defensive decisions, and reason.
According to Thomas, a higher-order thinker asks questions that probe what is known, deducts possible outcomes of a particular situation using principles, and tests one's own line of thinking and reasoning. Higher-order thinking requires the use of basic thinking skills such as knowledge recall, comprehension, and application, but analysis, synthesis, and evaluation are its primary cognitive requirements (Bloom, 1964). Since information is only useful when it can be applied and used for solving problems and making predictions (Underbakke et al., 1993), higher order thinking provides a foundation for effectively dealing with information (Halpern, 1984).

However, compared with educated students of other nations, our students are falling behind academically (Sternberg, 1985) due to underdeveloped higher-order thinking skills. For U. S. students, performance on moderately complex and scientific tasks has not changed in almost a decade, and only a small number of students, merely 7 % of 17 year olds, demonstrate such higher-level skills (Center for Critical Thinking and Moral Critique, 1992).

Thus, a lack of correspondence exists between that which is needed to develop higher-order thinking, and that which is actually being offered to students. Lecture, the most commonly used instructional method in the university system, often only offers students the opportunity to develop higher-order thinking skills on their own (Whittington et al., 1997). Most students, though, do not have the background in thinking skills development or metacognitive analysis to develop their own thinking skills (Center for Critical Thinking and Moral Critique, 1992). Ericksen (1984) concluded that students learn what they find interesting and only remember what they understand.

Previous studies have stated that professors often concern themselves with the content of their lectures, but spend less time thinking about student performance and the cognitive level their instruction reached (Whittington and Newcomb, 1991). In reality, the necessary higher-order thinking skills needed by students can only be developed through a learning environment that consciously teaches thinking skills and provides opportunities for interaction (Thomas, 1987).

However, a study by Cano and Newcomb (1990) showed that 60% of teacher instructional methods focused on knowledge and comprehension; 20% on application and analysis; and another 20% on synthesis and evaluation. Whittington (1995), in a study of 30 professors from The Pennsylvania State University, found that nearly 80% of discourse in college classrooms was at lower cognitive levels.

Engaging Thinking in Classrooms

The outcome of a curriculum should be to engage students in thinking at higher cognitive levels (Whittington and Bowman, 1994). Cano and Newcomb (1990) recommended that "teachers of agriculture should further develop a curriculum which appropriately challenges students at all levels of cognition" (p. 75).

Not only will a cognitively challenging curriculum enhance cognitive thinking levels in students, but the way in which the curriculum is taught will make the difference (Whittington and Bowman, 1994). Underbakke, et al. (1993) suggested that the teacher is the most powerful control factor that influences students' development of higher order thinking skills. Cano and Martinez (1991) concluded that "agricultural educators [need] to challenge students to develop cognitive abilities and critical thinking skills at higher levels via the instruction they provide" (p. 28).

An earlier study of strategic teaching methods concurred with recent research which concluded that teachers should establish goals for their instruction, and should consider teaching topics which are meaningful, applicable, and useful in students' lives (Ogle, 1989). Ogle stressed the importance of feedback between students and teachers, and also suggested using application and integration activities following the lesson in order to promote a deeper understanding of the subject.

Purpose and Objectives

The purpose of this study was to assess and compare the cognitive levels of instruction among professors from the Pennsylvania Governor's School for the Agricultural Sciences (PGSAS), and the cognitive levels of thought among PGSAS scholars. Specifically, the research questions guiding this study were:

- At what level of cognition were professors actually teaching?
- At what level of cognition were students actually operating?
- What is the comparison between the cognitive level of the professors' classroom discourse and the level reached by the students in those classrooms?

Methods/Procedures

Professors

Population and Sample

The target population in this study was 16 professors from the PGSAS at The Pennsylvania State University. Four professors' classes were randomly selected for analysis.

Instrumentation

In 1968, Webb used Bloom's Taxonomy to create the FTCB to assess the cognitive level of classroom discourse (the formal speech or conversation delivered during class) professors use when they teach. The FTCB utilizes 55 observable behaviors indicative of the various cognitive levels identified by Bloom's Taxonomy. In the "knowledge" category, 17 observable behaviors are listed on the instrument; for "comprehension," 12 observable behaviors are listed; for "application," four observable behaviors are listed; for "analysis," 11 observable behaviors are listed; for "synthesis," nine observable behaviors are listed; and for "evaluation," two observable behaviors are listed.

Validity for this instrument was based upon its direct development from Bloom's Taxonomy and the support generally given to this hierarchy of cognitive behaviors. Reliability for this instrument was established by coding audiotapes of lectures and establishing Spearman Rho reliability coefficients. Inter-rater reliability was approximately r = .97. Intra-rater reliability between previous researchers and the researchers in this study was approximately r = .96.

Data Collection

Professors knew which day the researchers would be in class. While attending each professor's class, the researchers recorded the frequency of observable teacher behaviors in six-minute intervals. Examples of observable behaviors at each level of Bloom's hierarchy include: "defines meaning of a term" (knowledge level); "shows cause and effect relationship" (comprehension level); "applies previous learning to new situations" (application level); "shows interaction or relation of elements" (analysis level) "formulates hypothesis" (synthesis level); and "evaluates something from evidence" (evaluation level).

In order to collect data on each professor's background, teaching skills, and knowledge of cognitive levels of teaching, professors completed a questionnaire. Each professor was also videotaped during the lecture.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences. Frequency of behaviors observed across all cognitive levels was totaled. Then the frequency within each cognitive level was divided by the overall total to acquire percentages of classroom discourse at each cognitive level. Cross-tabulations, frequencies, and means were calculated.

Students

Population and Sample

The second target population for the study was 64 scholars who attended the PGSAS during the summer of 1998. The 64 scholars were previously randomly divided into four sections of 16 scholars each for the school's administrative purposes. The student researchers were members of section one. Therefore, for access to the students, section one was utilized.

Since there were a limited number of days in which the researchers could interview scholars immediately after class, the four days in which there was at least a one-hour block of time immediately following class were chosen. Four scholars were randomly drawn for each interview date, followed by two alternates for each date. None of the alternates were used.

Instrumentation

A questionnaire designed by the researchers provided insight into potential reactions of the scholar to being interviewed, classes previously taken that would give background in the material being taught, and information about the scholars' interests and reasons for attending PGSAS. Scholars completed the questionnaire prior to the interview.

Data Collection

To understand how students are responding to teachers who teach to higher cognitive levels, researchers used think-aloud protocols (verbalization of thought processes). In this study, subjects knew prior to class that they would be interviewed about their thoughts during class. The subjects were told the objectives of the study. Immediately following class, students were given a hand-held tape recorder and asked to watch the videotaped lecture, listen, and audibly recall and describe their thoughts during class.

Data Analysis for Students

The audiotapes of the cognitive processes were transcribed by a staff assistant. Thoughts of students were sorted into six research-generated categories and then classified into Bloom's cognitive levels. The researchers categorized the thoughts as:

- Thoughts or observations about the professor
- Nonsense or unrelated thoughts
- Thoughts connected to previous learning
- Thoughts about past experiences prompted by class subject matter
- Deeper learning/questioning thoughts
- Thoughts about behavior that got/maintained attention

Findings and Results

Assessment of Cognitive Levels Reached by Professors

Professors in this study taught 43% (see Table 2) of the time at the knowledge (compilation of first three categories) level of cognition (range = 8-18%), 30% at the comprehension (translation and interpretation) level, (range = 10-20%), 7% at the application level, (range = 4-9%), 7% at the analysis level, (range = 6-8%), 7% at the synthesis level, (range = 4-10%), and 6% at the evaluation level, (range = 2-12%). The most frequently utilized classroom discourse was at the "knowledge of specifics" level. The least frequently utilized classroom discourse was at the "application, analysis, synthesis, and evaluation" levels.

Table 2
Assessed Level of Cognitive Instruction

Level of cognition	Range (%)	Total (%)	Range (f)
1.0 Knowledge of specifics	8 - 18	17	45 - 81
1.2 Knowledge of ways and means of dealing with specifics	5 - 12	11	27 - 63
1.3 Knowledge of universals and abstracts	4 - 18	15	29 - 84
2.0 Translation	10 - 18	14	43 - 63
3.0 Interpretation	11 - 20	16	48 - 70
4.0 Application	4 - 9	7	11 - 38
5.0 Analysis	6 - 8	7	18 - 36
6.0 Synthesis (Creativity)	4 - 10	7	16 - 42
7.0 Evaluation	2 - 12	6	7 - 63

Note. 1.0+1.2+1.3 = Bloom's "knowledge" level; 2.0+3.0 = Bloom's "comprehension" level.

The most common type of thought expressed by students (68%, see Table 3) was "random or nonsense thoughts" (metacognitive processes unrelated to class subject-matter). An example was, "It makes me mad when I can't find a parking place." The second most common category of thought (12%) was "thoughts about past experiences prompted by class subject-matter." An example was processed while the professor was discussing the way pork is currently being bred for leanness. The student thought, "It doesn't matter how lean they make pork, I still won't like it." The least used category of thought was "deeper learning/questioning thoughts" (3%). An example was, "If they can put windows into cows' stomachs to measure nutrient absorption, what can we learn to help people"?

Table 3
Students' Categories of Thoughts

Categories of thoughts	Range (%)	Total (%)
Thoughts or observations about the professors	1 - 5	3
Nonsense or unrelated thoughts	37 - 86	68
Thoughts connected to previous learning	6 - 20	10
Thoughts about past experiences prompted by class subject matter	2 - 25	12
Deeper learning/questioning thoughts	2 - 7	3
Thoughts about behavior that got/maintained attention	0 - 6	4

Students' Cognitive Level of Thoughts

The most common cognitive level of students' thoughts in class was "knowledge level" (12.7%, see Table 4). Knowledge was considered in two different forms: a) searching for, and b) expressing the recognition of basic knowledge. For instance, when the professor was showing students the uterus of a pig, one student thought, "Which way do they come out [when they are born]"? This example is a search for knowledge. When a professor was discussing the domestication of different plant crops, and the student thought, "When I saw that blueberries were domesticated in North America, I remembered other fruits that were domesticated in the U. S," the student was demonstrating an expression of basic knowledge.

Table 4
Comparison of Professors' and Students' Cognitive Level Reached During Class

Cognitive level	Professors (%)	Students (%)
Knowledge	43	12.7
Comprehension	30	11.8
Application	7	2.0
Analysis	7	4.5
Synthesis	7	<1
Evaluation	6	1
Other	0	68
Total	100	100

The next most used level of cognition was comprehension (11.8%). Comprehension involves two forms: a) to understand information, and b) to question the information given. For instance, with regard to understanding information, a professor was describing the antibodies in a human mother's milk, and the student thought, "If the mother is malnourished, the children will be [malnourished] as well because there won't be enough nutrients in the milk." The questioning form of comprehension is shown in the following situation: A professor was examining the uterus of a pregnant cow, and there were no ovaries attached to the uterus. The student thought, "Why are the ovaries missing"?

The application level of thought involved an average of 2% of the students' thoughts in class. For example, while the professor was discussing the effects of obesity on cancer rates, a subject thought, "My mom is a health nut, so she'll have a better chance of not getting [cancer]."

The analysis level of cognition consumed an average of 4.5% of the thoughts in class. For example, when discussing evolution in class, a student was reminded of learning about evolution and creation, and wondered, "What are the components of evolution and creation that can be combined"?

Less than 1% of students' thoughts could be classified at the synthesis level. An example of synthesis level thinking occurred during a class discussion on the differences between breast milk and formula. A student thought, "Why can't we make [breast milk and formula] the same? I don't know all the different hormones [contained] in milk. If I know the natural ingredients how could I combine them to make perfect synthetic breast milk"?

In this study an average of 1% of students' thoughts in class were devoted to the evaluation level. Over two-thirds (68%) of thoughts generated by students during class were "random nonsense thoughts"; these were not classified as part of the cognitive assessment.

Conclusions

Professors in this study were generally teaching at lower cognitive levels. For example, the most common teaching behaviors recorded among professors in this study were: basic elicitation of facts, verbalizing from and/or creating graphic representations, making generalizations about concepts or ideas, summarizing and concluding from what had been said, and giving reasons for facts. When professors did teach at higher cognitive levels, the most common behaviors were: producing unique communication and/or divergent ideas, showing the interaction and relationship among elements, and applying abstract knowledge in a practical situation.

Students in this study thought primarily "random nonsense thoughts" during lectures. They rarely thought at the higher cognitive levels no matter the cognitive level at which the professor taught.

By using think-aloud protocols, comparisons could be made between the higher level cognitive opportunities given by professors during lectures, and higher level cognitive opportunities embraced by students. The data reflect that much work needs to be done to increase the frequency of opportunities offered by professors to students to reach higher cognitive levels during class. Then more work must be done to get students' thinking more closely aligned to the professors' opportunities.

In many instances this alignment can be achieved by making professors aware of techniques that can be used to reach higher cognitive levels, and by reviewing with them some basic teaching methodologies. The goal is that by providing professors with techniques and methodologies designed to increase the level of cognitive processes, a higher quality of learning will be achieved in college classrooms.

Recommendations

Based on the conclusions of this study, the researchers recommend that **professors**:

- be made aware of cognitive levels of teaching by participating in faculty seminars and workshops, or by reading literature related to teaching at higher cognitive levels.
- make students aware of the objectives of the lesson prior to the start of the lesson (Perrone, 1994), so students can focus on the specific's of the content.
- teach subject matter by linking knowledge with real-life situations and issues (Perrone, 1994). By making content relevant, students will more quickly make applications in their minds during lecture.
- assist students in the formulation of new hypotheses related to the content of the lecturer (Bloom et al., 1956).
- use more visual aids along with "user-friendly" terminology wherever possible to attract and maintain the attention and focus of students.

Based on the conclusions of this study the researchers recommend that **students**:

- discipline themselves to pay attention and focus on the materials presented.
- challenge themselves to think in-class about applications of classroom material to their everyday lives.
- analyze information as it relates to previous and future life situations.
- synthesize content to follow-through a problem and formulate new hypotheses.

- evaluate the subject-matter to determine its effectiveness in solving problems and making decisions.

Implications and Discussion

Professors

Students should receive feedback from professors throughout the duration of the class, so that students may then use the feedback to assess themselves (Terenzini et al., 1995). Self-assessment breeds a higher level of understanding of the material taught and of one's own cognitive processes, which theoretically leads students to perform at higher levels of cognition including analysis, synthesis, and evaluation.

Most importantly, however, is the clear need for professors to become aware of cognitive levels of teaching (Whittington, 1995). When professors are aware of cognitive levels of teaching, they will become aware of those classroom behaviors and teaching techniques that help students think at higher cognitive levels. They will, therefore, be able to assess their teaching, plan new lessons, and adjust their classroom behaviors to teach at higher cognitive levels.

Students

An interest in the subject material of the class played a large role in whether or not the student maintained attention (Ericksen, 1984). Although a plethora of thoughts were present during class, few were related to the material being presented. Classroom material that students could easily apply to life or associate with recent circumstances, and was most readily understood, was most easily absorbed by students.

Certain teacher behaviors stimulate students' thought processes. When professors asked for input and ideas during class, students reported being more actively engaged in the learning process; when there was interaction with the professor, there was more motivation to pay attention and participate. Students were also motivated by visual stimulation. For example, when researchers asked students what they were thinking during a given point in class, they may not recall it until a visual aid from class was placed in front of them; at that moment students could recall what the professor was discussing and what they were thinking. Students were able to describe various gestures professors had used in reference to the subject matter. They stated that when the professor asked the class to figure out problems for themselves, more thought processes were engaged.

Summary

The combination of think-aloud protocols and classroom observations allowed researchers to more deeply probe the potential gap between that which professors are saying during lectures and that which students were mentally processing. It is now important to replicate the study using broader samples of professors and students so that a knowledge base can be built. Once this cognitive relationship between professors and students is concretely established, educators can effectively assist faculty and students in enriching the teaching-learning process in college classrooms.

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Using Think-Aloud Protocols to Compare Cognitive Levels of Students and Professors in College Classrooms

A Critique

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Contribution and Significance of Research

The support from the review of literature for the theoretical base that undergirds the study contributes greatly to the significance of the research. The findings, implications, and recommendations arising from the research should be required reading for college professors taking part in faculty orientation or improvement of teaching seminars. The most important implication arising from this study is that if college professors understand better the relationship in cognitive levels of learning that exist between them and their students, then they can influence more effectively the levels of learning engaged in and used by those students. Another implication exists that teacher educators can use the findings of this study as ammunition in preparing teachers to be more effective whether in a classroom or in a field setting. While the study was conducted in the setting of college classrooms, implications exist that extension personnel or other adult educators engaged in helping people learn to reason and to make decisions could learn from this research. Then too, the implications drawn by the authors and the recommendations made for both professors and students are tied well with the findings of the research reported and with previous research. Consequently, this research makes a truly significant contribution to understanding better ways of creating an effective teaching-learning process.

Procedural Considerations

The study was very well designed, tightly controlled, and well conducted, even though much subjective interpretation of actions and thoughts of both the professors and the students taking part in the study took place. The variety in the courses in agriculture that provided the setting in which professors and students were studied contributed to the elimination of subject-matter bias being a contaminating factor that affected results.

Questions for Consideration

Would a logical follow up to this study be the development of teaching guides from many different fields with examples of students' thoughts from each of the students' categories of thoughts as used in this research to give teachers, prospective teachers, and college faculty in agriculture additional insights into what may be passing through the minds of students when in the teaching-learning setting? In addition to building the study around Bloom's six-step hierarchical system of thinking in the cognitive domain, would it be worthwhile for future researchers to use think-aloud protocols to compare the cognitive levels when professors attempt to develop the seven apperceptive levels of learning, namely, knowledge, skills, interests, understandings, appreciations, values, and ideals?

Beliefs About a Constructivist Model for Teaching Compared with Traditional Teaching Methods Among Teacher Education Students

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Abstract

The educational reform literature includes the need to develop students' abilities in thinking and reasoning. This theme is primary among the factors associated with teaching and learning in the research literature as well. A focus of these efforts within educational research is a growing movement based on constructivism (Brooks and Brooks, 1993). Constructivism as a theory of learning is based on the proposition that knowledge cannot be "given" to someone, only information can be given. True knowledge must be "constructed" in the mind of the learner, within the context of that individual's past experiences and knowledge base.

This study sought to describe the beliefs held by pre-service teachers about teaching and learning based on component principles of the constructivist model of teaching. The populations for this census study consisted of students in a general pre-service teacher education course, and students in a methods of teaching agriculture course. This was a descriptive study, using a written questionnaire. Thirty-two matched items represented 16 components which sought to operationalize major constructs of the constructivist model of teaching.

The findings in this study indicate that, when traditional approaches to teaching and learning are matched with constructivist-based approaches, students generally prefer the constructivist-based approaches. Agricultural education historically has been popular to many students because it provides for alternative teaching and learning strategies, when compared with other high school courses, through hands-on application. It is likely that hands-on practice is one avenue which allows students the opportunity to "create" knowledge within their own minds.

Introduction

The current educational reform movement began in the 1980s and, interestingly, continues into a new century. An entire national movement that began as a white paper without the citation of any empirical evidence to substantiate its claims ("A Nation At Risk," National Commission on Excellence in Education, 1983) continues as a campaign at all levels of politics and government. During those two decades, educational reform has focused both on the local school and on the preparation of teachers.

Whatever reforms are eventually agreed to, it will be the classroom teachers who will be responsible for implementation. Who are our teachers? Where do they come from? What types of education have they experienced? What do they believe about teaching and learning? To what extent are they products of their own environments? An analysis of the beliefs about teaching and learning held by pre-service teachers could prove useful in addressing their role in educational reform.

If current and prospective teachers are the products of their own education, what have they experienced? W.R. Wees, in Nobody Can Teach Anyone Anything (1971) made some interesting observations about schooling that are relevant in the year 2000. Referring to an earlier period in Western culture he noted,

> The Industrial Revolution forced hordes of youngsters into school.... With so few teachers, somebody had to invent a way to teach so many newcomers.... Mr. Lancaster's invention was quite simple. He just herded a thousand youngsters into a big room, sat them at rows of benches, appointed older children as monitors, and taught the lesson to the monitors – who went down, each to his own row, and retaught the lesson to the assigned benchful of children who dutifully repeated it back to the monitor (p. 1).

Wees noted that new innovations have changed the medium, the use of the monitors has been replaced with educational technologies, but "the same sort of thing goes on in 95 percent of the classrooms in the Western hemisphere – from the rote memorization of word symbols to the memorization of dates, names, and descriptions of events" (p. 2). Wees observed that this process, "... becomes really amusing in university (classrooms) where students buy one another's notebooks, lab notes, and essays so that they can submit copies to get their term grades. If teachers are to employ effective methods and procedures for teaching and learning in the classroom, where must they first encounter them?" (p. 2)

Glasser (1992) called the memorization of facts "throwaway information." He said that in quality learning environments all of the information on what is studied is always on hand, not only during class but during all tests.

> No student should ever suffer academically because he or she forgot some fact or formula. The only useful way to test students' knowledge of facts, formulas, and other information is to ask not what the information is, but where, when, why, and how it is of use in the real world (p. 692).

Glasser posited that the real-world value of what is to be learned should focus on "useful skills," not on information that has no use in the lives of those who are taught it. "I define a skill as the ability to use knowledge."

Numerous authors have identified components of effective teaching. (See, for example, Brophy and Good, 1986). Several of these have explored the relationships between specific teacher activities and measurable student achievement. Fewer have explored the multi-dimensional relationships between teaching and student learning. For example, Feldman (in Svinicki and Menges, Eds., 1996) extended the work of d'Apollonia and Abrami (1987, 1988) and Abrami, Cohen and d'Apollonia (1988), and Cohen's (1980, 1981, 1987) meta-analysis on the association between student achievement and various "instructional dimensions." He identified 21 such dimensions that were statistically significant in their correlations.

A common set of student outcomes in the reform literature is related to the need to develop students' abilities in thinking and reasoning. This theme is primary among the factors associated with teaching and learning in the research literature as well. Means and Knapp (1991) reminded us that cognitive research on comprehension processes has shown the importance of trying to relate what a student learns to what s/he already knows, of checking to see that the new information fits with prior knowledge, and of setting up expectations for what is to follow and seeing whether those expectations are fulfilled. Means and Knapp (1991) suggested a new set of curricular principles:

- Focus on complex, meaningful problems.
- Embed basic skills instruction in the context of more global tasks.
- Make connections with students' out-of-school experience and culture.
- Model powerful thinking strategies.
- Encourage multiple approaches to academic tasks.
- Provide scaffolding to enable students to accomplish complex tasks.
- Make dialogue the central medium for teaching and learning (286-288).

A focus of these efforts is a growing movement from within education, based on constructivism (Brooks and Brooks, 1993). Constructivism as a theory of learning is based on the proposition that knowledge cannot be "given" to someone, only information can be given. True knowledge must be "constructed" in the mind of the learner, within the context of that individual's past experiences and knowledge base. "We construct our own understandings of the world in which we live," according to Brooks and Brooks (p.4).

Windschitl (1999) explained that, "Constructivism is premised on the belief that learners actively create, interpret, and reorganize knowledge in individual ways" (p.752). According to Windschitl, a growing number of teachers are embracing the fundamental ideas of constructivist learning, "that their students' background knowledge profoundly affects how they interpret subject matter and that students learn best when they apply their knowledge to solve authentic problems, engage in 'sense-making' dialogue with peers, and strive for deep understanding of core ideas rather than recall a laundry list of facts" (p. 752).

What teacher practices constitute constructivism? Windschitl (1999) called "constructivism a culture – not a fragmented collection of practices" (752). Brooks and Brooks (1993) identified several traits of constructivist teachers:

1. Encourage and accept student autonomy and initiative.
2. Use raw data and primary source, along with manipulative, interactive and physical models.
3. When framing tasks, constructivist teachers use cognitive terminology such as "classify," "analyze," "predict," and "create."
4. Allow student responses to drive lessons, shift instructional strategies, and alter content.
5. Inquire about students' understandings of concepts before sharing their own understandings of those concepts.
6. Encourage students to engage in dialogue, both with the teacher and with one another.
7. Encourage student inquiry by asking thoughtful, open-ended questions and encouraging students to ask questions of each other .
8. Seek elaboration of students' initial responses.
9. Engage students in experiences that might engender contradictions to their initial hypotheses and then encourage discussion.
10. Allow wait time after posing questions.
11. Provide time for students to construct relationships and create metaphors.
12. Nurture students' natural curiosity through frequent use of the learning cycle model (pp. 103-118).

Purpose of the Study

Understanding the beliefs about teaching and learning held by teachers may provide information in reforming teacher education programs. Further, if pre-service teachers mimic the teaching they have experienced, an analysis of the teaching methods used in all college-level courses taken by pre-service teachers may be of value.

This study sought to describe the beliefs about teaching and learning held by pre-service teachers. Specifically, it sought to explore their beliefs about component principles associated with the constructivist model of teaching. The study was guided by the following research questions:

1. What are the beliefs about several component principles of the constructivist model of teaching and learning held by pre-service teachers?
2. Is there a difference between pre-service teachers of agriculture and all other pre-service teachers in their beliefs about several component principles of the constructivist model of teaching and learning?

Methods

The populations for this census study consisted of all students in all sections of a general pre-service teacher education course (N = 69), and all students in a methods of teaching agriculture course (N = 18) at the University of Arkansas in the Fall of 1999. Instructors in each section of each course provided the researcher with access to the students for data collection.

This was a descriptive study, using a written questionnaire. Thirty-two matched items comprised the relevant part of the questionnaire. Subjects were asked to respond to each item using a four-point Likert-type scale (1 = "Strongly Disagree" to 4 = "Strongly Agree"). The 32 items represented 16 components which sought to operationalize major constructs of the constructivist model of teaching. The constructs included:

- sources of content for teaching,
- the goal of teaching and learning,
- how students learn,
- the role of the teacher in teaching and learning,
- how teachers teach, and
- assessment of learning.

The instrument was based, in part, on works by Brooks and Brooks (1993), a review of the literature in effective teaching, and procedures used in the development of constructivist teaching materials for a methods of teaching course. Each item pair sought to represent a teacher method or activity based on the constructivist approach to teaching, and a contrasting teacher method or activity based on a traditional approach to teaching.

The instrument was reviewed by a panel of teacher educators from several institutions for content validity. After revision, it was administered to pre-service teacher education students to establish instrument stability. This was done via a test-retest procedure at approximately a two-week interval. The test-retest procedure yielded a coefficient of stability estimate of 0.65. The instrument was administered to all students in all sections of CIED 1002 and AGED 3133 at the University of Arkansas in the Fall of 1999. The internal consistency of the instrument with these students was found to be 0.95.

Descriptive population statistics were used to summarize and analyze the data. Because data for this study compares two independent populations, inferential statistics were not used.

Results

The data are presented in Table 1. Matched items, traditional teaching approach and constructivist teaching approach, are paired. In each pair, the traditional teaching approach is listed first, and the constructivist teaching approach is listed second. The obtained mean ratings on each item for both the general teacher education student and the agricultural education student populations are listed. While some differences between the population means between the two groups exist for many items, practical and meaningful differences were not found for most of the items. This indicates that each group of students generally agreed with the other on their beliefs about teaching and learning.

Table 1. Beliefs about teaching and learning held by agricultural teacher education students and other teacher education students.

#	Item	Group					
		All Teacher Education			Agricultural Education		
		N	μ^1	SD	N	μ^1	SD
	SOURCES OF CONTENT FOR TEACHING						
24	Course activities and materials should rely heavily on the prescribed text books and work books.	67	2.22	0.54	17	2.12	0.48
5	Course activities and lessons should rely heavily on the use of real-world sources of data, and on student involvement with hands-on materials.	69	3.36	0.51	18	3.44	0.51
6	Instruction should provide technical content about accepted theories of experts.	67	2.67	0.59	18	2.67	0.48
13	Instruction should provide information that helps students to learn to build their own theories.	69	3.22	0.64	18	3.22	0.43
20	Strict adherence to course content that is determined at the beginning of the school year is very important and highly valued.	66	2.61	0.60	18	2.39	0.50
23	The students may help determine the content to be taught and how it is to be taught, based on their interests and learning styles.	69	3.09	0.53	18	3.33	0.48
	THE GOAL OF TEACHING AND LEARNING						
1	A primary goal of teaching is to get students to respond with the "correct answers."	68	2.63	0.75	18	2.67	0.59

10	A primary goal of teaching is to help students develop understandings of major concepts rather than detailed content.	67	2.88	0.61	17	3.17	0.53
	HOW STUDENTS LEARN						
7	In a student's mind, new knowledge is learned in isolation from other knowledge.	68	1.97	0.57	18	2.11	0.47
31	In an individual's mind, new knowledge is learned within the context of prior knowledge.	69	3.23	0.49	18	3.00	0.34
30	Students should be "instructed in" the subject matter. The instructor is responsible for the students' learning.	67	2.78	0.52	17	2.59	0.51
17	Students should "inquire into" the subject matter. The students are responsible for their own learning.	67	2.49	0.59	18	2.61	0.50
18	Learning should be an activity in which the students spend much of their time mimicking (copying) the activities of the teacher in order to learn the correct knowledge or procedures.	68	2.19	0.63	18	1.94	0.54
29	Learning should be an activity in which the students are presented information or problems-to-solve for which they must seek information in order to internalize and create new knowledge in their own minds.	68	3.09	0.41	18	3.00	0.34
21	Knowledge is something to be acquired by individuals as learners.	67	3.03	0.46	18	3.11	0.32
28	Knowledge is something to be created within the minds of individuals.	67	2.97	0.55	18	2.94	0.64
	ROLE OF THE TEACHER IN TEACHING AND LEARNING						
25	Students should understand that the lesson "belongs to" the instructor because he/she is the "expert" and knows how the content will be important to the students in the future.	68	2.35	0.68	18	2.22	0.65
11	Students should have a sense of ownership of the lesson because they are interested in learning how the content is applied to real-world problems.	67	3.03	0.42	18	3.22	0.43
12	The teacher should always decide what is taught and how it is to be taught. The teacher is the authority.	68	2.47	0.72	18	2.11	0.68
22	Teachers should pursue students' questions about the world and try to integrate them into the lessons as the term progresses, even if it means deviating from a fixed course plan.	68	3.26	0.56	18	3.17	0.51
14	In teaching a lesson, teachers should not be concerned with relating students' prior knowledge, or their environment and experiences, with the lesson content.	69	1.71	0.64	18	1.72	0.57
27	In the learning process, teachers should serve as mediators between the students' individual prior knowledge, their environment and past experiences, and the lesson content.	68	3.18	0.45	18	3.06	0.42

15	Teachers should behave as the expert, serving as the source of knowledge, and disseminating information to students.	66	2.73	0.64	17	2.41	0.71
26	Teachers should operate the class in an interactive manner with students, promoting open discussion in the learning environment.	69	3.64	0.48	18	3.28	0.46
	HOW TEACHERS TEACH						
3	Students should learn from working primarily alone on course assignments, lab activities, and assessment activities.	69	1.93	0.52	18	1.94	0.23
9	Students should learn from working primarily in groups.	66	2.42	0.56	18	2.72	0.46
4	Course material should be presented in small pieces, with emphasis on learning "basic" skills, before students are given the "big picture" of how everything fits together.	69	2.97	0.66	18	3.11	0.68
19	Course material should be presented so that students have an idea of the big picture first, then taught the basic skills and details of the parts.	67	2.73	0.73	18	2.72	0.67
8	Courses should be taught as unique and separate bodies of knowledge.	68	2.26	0.61	18	2.11	0.58
32	Courses should be taught so students see that the content relates to content in other courses.	69	3.23	0.49	18	3.22	0.43
	ASSESSMENT OF LEARNING						
2	Assessing what students have learned occurs almost entirely through testing.	69	1.93	0.65	18	2.17	0.62
16	Assessing what student have learned best occurs through teacher observations of students at work and through student exhibitions.	68	3.10	0.43	18	3.00	0.59

[1]Scale: Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4

Note: First statement in each pair is "traditional" approach; second statement is constructivist approach.

Sources of Content for Teaching. Using a 4-point Likert-type scale, subjects disagreed with the statement that "course activities and materials should rely heavily on the prescribed text books..." (item 24: GTE $\mu = 2.22$; AGED $\mu = 2.12$). This statement represents a more traditional approach to teaching. In contrast, the subjects agreed that course activities and lessons should "rely heavily on the use of real-world sources of data, and on student involvement in hands-on materials" (item 5: GTE $\mu = 3.36$; AGED $\mu = 3.44$). This is an approach to teaching that better represents the constructivist model. Both general teacher education and agricultural education students were neutral in their beliefs that "instruction should provide technical content about accepted theories of experts" (item 6: GTE $\mu = 2.67$; AGED $\mu = 2.67$). However, they both agreed that instruction should "help students to learn to build their own theories" (item 13: GTE $\mu = 3.22$; AGED $\mu = 3.22$).

When asked to respond to the statement that "Strict adherence to course content that is determined at the beginning of the school year is very important and highly valued," each group was fairly neutral (item 20: GTE μ = 2.61; AGED μ = 2.67). However, they agreed with the statement, "Students may help determine the content to be taught and how it is to be taught, based on their interests and learning styles." For this statement, general teacher education students gave it a mean rating of 3.09 while agricultural education students rated it at 3.33, indicating a stronger belief in the statement.

The Goal of Teaching and Learning. Both general teacher education students and agricultural education students were neutral with the statement that "A primary goal of teaching is to get students to respond with the 'correct answers' " (item 1: GTE μ = 2.63; and AGED μ = 2.67). However, when posed with the statement, "A primary goal of teaching is to help students develop understandings of major concepts rather than detailed content" (item 10), student agreement was more positive (GTE = 2.88; AGED = 3.17). In fact, the level of agreement with this statement was much higher among agricultural education students than for general teacher education students.

How Students Learn. On the item, "In a student's mind, new knowledge is learned in isolation from other knowledge" (item 7) each group disagreed with the statement (1.97; 2.11). However, they agreed with the statement that "new knowledge is learned within the context of prior knowledge" (item 31: 3.23; 3.00).

Both groups were generally neutral to the statements over who in the teaching - learning process is responsible for the students' learning (items 30 and 17). Mean responses were 2.78 for general teacher education students and 2.59 for agricultural education students to the statement, "students should be 'instructed in' the subject matter ... the instructor is responsible for the students' learning" (item 30). Similar means were obtained for the constructivist statement that, "students should 'inquire into' the subject matter ... the students are responsible for their own learning (item 17: 2.49; 2.61).

General teacher education students and agricultural education students both disagreed with the statement that "learning should be an activity in which students spend much of their time mimicking the activities of the teacher in order to learn the correct knowledge or procedures" (item 18: 2.19; 1.94). Conversely, each group agreed with the statement that, "learning should be an activity in which students are presented information or problems to solve for which they must seek information in order to internalize and create new knowledge in their own minds" (item 29: 3.09; 3.00).

Interestingly, each group agreed with both types of statements (traditional teaching approach and constructivist approach) about the acquisition of knowledge. Item 21, "Knowledge is something to be acquired by individuals as learners" earned mean responses of 3.03 (GTE) and 3.11 (AGED). Item 28, "Knowledge is something to be created within the minds of individuals" earned mean responses of 2.97 (GTE) and 2.94 (AGED).

The Role of the Teacher in Teaching and Learning. Subjects in both groups disagreed that "Students should understand that the lesson 'belongs to' the instructor because he/she is the 'expert' and knows how the content will be important to the students in the future" (item 25: 2.35; 2.22). Both groups agreed that "Students should have a sense of ownership of the lesson because they are interested in how the content is applied to real-world problems" (item 11: 3.03; 3.22).

On items related to the authority of the teacher in curriculum planning, the general teacher education group was neutral (2.47) on item 12, "The teacher should always decide what is taught and how it is to be taught. The teacher is the authority." The agricultural education group disagreed with this statment (2.11). When posed with the constructivist converse statement, "Teachers should pursue students' questions about the world and try to integrate them into the lessons as the term progresses, even if it means deviating from a fixed course plan" (item 22), both groups agreed (3.26; 3.17).

For the related statements, "teacher should not be concerned with relating students' prior knowledge ... with the lesson content" (item 14) and "teachers should serve as mediators between the students' individual prior knowledge ... and the lesson content" (item 27), each group indicated disagreement with the former (1.71; 1.72) and agreed with the latter (3.18; 3.06).

Item 15, "Teachers should behave as the expert, serving as the source knowledge, and disseminating information to students" earned neutral responses (2.73; 2.41). However, item 26, "Teachers should operate the class in an interactive manner with students, promoting open discussion in the learning environment" earned strong agreement from the general teacher education group (3.64) and agreement from the agricultural education group (3.28).

How Teachers Teach. When posed with statements about how students should learn, the subjects in each group did not believe that students should learn "from working primarily alone" (item 3: 1.93; 1.94), but were neutral with the statement that they should learn "from working primarily in groups" (item 9: 2.42; 2.72).

Subjects in both groups agreed with the statement from the traditional teaching model that "Course material should be presented in small pieces, with emphasis on learning 'basic' skills before given the 'big picture'..." (item 4: 2.97; 3.11). The groups recorded neutral to slight agreement with the constructivist - based statement that "Course material should be presented so that students have an idea of the big picture first, then taught basic skills and details..." (item 19: 2.73; 2.72).

Finally, when presented the statement that "Courses should be taught as unique and separate bodies of knowledge" (item 8) subjects disagreed (2.26; 2.11). They agreed that "Courses should be taught so students see that the content relates to content in other courses" (item 32: 3.23; 3.22).

Assessment of Learning. Students disagreed with the statement that "Assessing what students have learned occurs almost entirely through testing" (item 2: 1.93; 2.17). They agreed that assessment best occurs through "teacher observations of students at work and through student exhibitions" (item 16: 3.10; 3.00).

Related to the second research question, few practical differences between the groups, general teacher education students and agricultural education students, were found for the constructs under study.

Conclusions, Recommendations, Implications

Understanding the beliefs about teaching and learning held by teachers may provide information in reforming teacher education programs. Competing models for teaching and teacher education exist. Some accepted models are, in large part, historical artifacts, and are based on beliefs about teaching and learning which may no longer prove to be true. Among these are traditional approaches to teaching. New approaches are being developed such as those based on the constructivist theory of learning. This study sought to describe the beliefs about teaching and learning held by pre-service teachers, specifically their beliefs about component principles associated with the constructivist model of teaching compared with traditional approaches to teaching.

Students in a general pre-service teacher education course (N = 69) and students in a methods of teaching agriculture course (N = 18) served as subjects in this descriptive census study. Thirty-two items represented 16 components which sought to operationalize major constructs of a constructivist model of teaching, and an antithetical statement representing more traditional approaches to teaching.

On some items, subjects' mean ratings indicated that they agreed both with the constructivist method and with the traditional method. While the items on the instrument may be representative of some of the major constructs in constructivist teaching, this may indicate that the instrument is not a good discriminator to force students into agreeing with one or the other. Arranging these statements in a bi-polar format may improve the internal consistency.

Of the three pairs of items representing the construct, "Sources of Content for Teaching" both general teacher education students and agricultural education students rated the constructivist-based statements higher than they did the traditional teaching statements. The construct, "The Goal of Teaching and Learning" had one pair of items, and students from both groups rated the constructivist-based item higher than the traditional. There were four pairs of items for the construct, "How Students Learn." Students rated the constructivist-based choice higher for two of the four pairs. For one pair of items, "students should be instructed in" the subject matter versus "students should inquire into" the subject matter," students in both groups were neutral in their beliefs about both the traditional and the constructivist-based alternatives. On the items, "knowledge should be acquired by" learners vs. "knowledge is created within the minds of learners" students rated both alternatives positive. However, the traditional-based teaching statement was rated higher. "The Role of the Teacher in Teaching and Learning" had four pairs of items. Students in both groups rated the items representing the traditional approach as neutral to negative, while each of the constructivist-based choices was rated positively. "How Teachers Teach" had three items. Students rated two of the three constructivist-based alternatives higher than the traditional match. "Assessment of Learning" had one item, and students in both groups rated the constructivist approach higher than the traditional alternative.

Constructivist approaches to teaching and learning cause the learner to assume responsibility for his/her learning by actively engaging them in the teaching - learning process. The findings in this study indicate that, when traditional approaches to teaching and learning are matched with constructivist-based approaches, students generally prefer the constructivist-based approaches. This should come as little surprise to agricultural educators. Agricultural education historically has been popular to many students because it provides for alternative teaching and learning strategies, when compared with other high school courses, through hands-on application. It is likely that hands-on practice is one avenue which allows students the opportunity to "create" knowledge within their own minds.

This study should be expanded and replicated and these findings should be explored with high school students. If confirmed for secondary school students, teacher education programs should begin to ensure that pre-service teachers are given the educational and experiential background that includes constructivist approaches to teaching and learning.

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Beliefs About a Constructivist Model for Teaching Compared with Traditional Teaching Methods Among Teacher Education Students

A Critique

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Contribution and Significance of Research

The authors assembled a good review of the literature on which to build the theoretical base for their research. It is hoped that this study could be replicated in other institutional settings, for the findings have significant implications for changes in the ways we prepare teachers to teach and in the expectations that we should have of teachers. For example, in the research reported, the cumulative ratings of the four constructivist statements on the role of the teacher in teaching and learning when compared with the ratings of the four traditional statements on the same topic should send a strong message, both to teacher educators and to teachers, that we should reexamine seriously the examples that we set for ourselves as teachers and what we teach that the role of the teacher should be with respect to teaching and learning. Also, the finding that the respondents rated "knowledge should be acquired by" learners somewhat higher than "knowledge is created within the minds of learners" is not vindication for the traditional "open the head, use funnel, pour knowledge in" crowd, but recognition that both emphases are important in how people learn. In general, the findings should bring satisfaction to the many agricultural educators who use various constructivist approaches in teaching.

Procedural Considerations

The methodology used in the study was sound. However, this discussant agrees with the authors that replicating the study, but rearranging the statements used in the scales into "...a bi-polar format may improve the internal consistency." If this is done, future researchers may want to consider using a seven or nine-point scale rather than a four-point scale so that respondents come closer to responding along a continuum.

Questions for Consideration

Does an implication exist that teachers and teacher educators should be made aware of the findings of this study because of the implications that exist as to how students would like to learn? Would it be good procedure to assess the learning styles used and preferred by the respondents and comparing those styles with their responses to "traditional" and "constructivist" items on the instrument used? This question is raised because of the nature of the responses to some items. For example, the respondents did not believe that students should learn "from working primarily alone" but were neutral with the statement that they should learn "from working primarily in groups." Their learning styles could have influenced their responses.

Perceptions of Freshman Agriculture Majors of Alternative Versus Conventional Agricultural Paradigms

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Abstract

This study examined the perceptions of freshman agriculture students enrolled at a land-grant university on the alternative and conventional paradigms of agriculture. Those who are proponents of these paradigms differ drastically in their views of agriculture's impact on the environment, the sustainability of current practices, and the policies needed to maintain a productive agriculture and viable rural America. The measurement of these beliefs was assessed on the Alternative vs. Conventional Agricultural Paradigm (ACAP) scale developed by Beus and Dunlap (1991). The findings revealed that freshman held views similar to those of conventional agriculturists. They largely agree that maintaining rural communities is essential to the future of agriculture, see farm tradition and culture as essential to good agriculture, and are more likely to see farming as primarily a business rather than a way of life. There was great variation in the scores by college majors. Agribusiness, turf management and poultry science majors held more of a conventional perspective of agriculture while entomology/pest management and horticulture majors tended more toward the alternative agriculture paradigm. Agricultural and extension education majors tended to hold more conventional views. Animal science majors had the greatest variability in scores. Differences in pre-college residence and parents educational level were low or moderate relationships. The freshman living on a farm reported the highest ACAP scores, which is a closer affiliation to the alternative paradigm. Higher ACAP scores were also found with students whose parents had a high school education and lower scores for students whose parents had a college education. Males tended to favor conventional agriculture more than females. These findings are similar to those of statewide farmers conventional agriculturists and senior students in the college.

Introduction and Theoretical Framework

Farmers and agricultural industry are increasingly becoming homogenized into mainstream U.S. society and its industrial economy. As a result, agriculture is rapidly losing its "uniqueness." Non-agricultural groups have become involved in agricultural policy and are outlining a new agenda largely of issues and problems defined by non-farm interests (Beus & Dunlap, 1993). Prior to this, agricultural policy was largely controlled by the major farm organizations, the agricultural committees of Congress, the United States Department of Agriculture, and to some extent the land grant colleges of agriculture. This shift in policy development is a paradigm shift --a change in the rules or boundaries of agriculture (Barker, 1993). As a result, two divergent viewpoints are developing regarding the desired future of agricultural production in the United States. According to Beus and Dunlap (1991) some promote the vision of agriculture as large scale, industrialized production that is capital intensive, highly mechanized, using extensive amounts of synthetic fertilizers and pesticides and may involve highly concentrated and intense livestock production. Knorr and Watkins (1986) call this " conventional agriculture." Conventional agriculture may also include the agricultural business complex with which today's farmers are highly integrated (Martinson and Campbell as cited in Buttel and Newby, 1980).

Other individuals have a vision for agriculture as smaller farm units with reduced use of agricultural chemicals, reduced energy use, greater farm self-sufficiency, and a goal of improved conservation and regeneration of agricultural resources such as soil and water (Buttel, Gillespie, Janke, Caldwell, & Sarrantonio, 1986). This is called "alternative agriculture" (Lockeretz, 1986) and encompasses many different approaches, ranging from organic farming to permaculture.

These conventional and alternative agriculture proponents differ drastically in their view of agriculture's impact on the environment, the ecological and socio-economic sustainability of current practices and the policies needed to maintain a productive agriculture and viable rural America. Defenders of the conventional agricultural system feel that current problems in agriculture can be solved by scientific and technical progress while those favoring alternative agriculture believe that conventional agriculture needs a complete revamping to solve the ecological, economic and social problems associated with agriculture (Beus, Dunlap, Jimmerson, & Holmes, 1991).

Increased public demands to hold corporations accountable for environmental damage and the increasing willingness of federal and state authorities to pursue civil and criminal environmental cases are expanding into the agricultural community. Opinion polls reveal that 80 % of Americans feel that farmers are polluters, especially those farmers using pesticides. It has been estimated that 64 % of America's rivers have been polluted as a result of agricultural production practices (Copeland, 1993).

Proponents of conventional agriculture have often ridiculed the environmental movement accusing their critics of being radical, of knowing little about farming, or the economics of the "real world" (Beus & Dunlap, 1990). This difference of opinion has escalated into political confrontation.

Beus and Dunlap (1991) propose that these viewpoints are paradigms that can be represented on a continuum from alternative to conventional. In order to assess adherence to either the alternative or conventional viewpoint, they developed the Alternative vs. Conventional Agricultural Paradigm (ACAP) scale. This scale measures basic beliefs and values assumed to constitute the two competing perspectives of agriculture. The instrument has been validated with known groups of alternative and conventional agriculturists, as well as statewide groups of farmers and agricultural faculty at a state land-grant university.

Graduates of U.S. colleges of agriculture will become leaders who will shape the policies and decisions about agriculture for the next generation. As the groups supporting alternative agriculture seem to be growing in number, size, and political influence while the farm population decreases, it will be incumbent upon agricultural graduates to assist communities to critically analyze agricultural science and practice. New skills will be needed to effectively use knowledge and technology in the change process. Agricultural education is situated in an important position in the ongoing debates of alternative and conventional agriculture production. With the vast changes taking place in agriculture, there is much attention being given to agriculture production needed to meet the demand of the global economy. Are changes needed in the curriculum of agricultural colleges? Since little is known about how these debates have influenced students enrolled in colleges of agriculture, it is important to understand the beliefs and values of future players in this agricultural debate.

Purpose and Objectives

The purpose of this study was to describe the beliefs of entering freshman in a college of agricultural, food and life sciences relative to their adherence to alternative versus conventional agricultural paradigms.

The specific objectives of the study were to:

1. Determine the alternative or conventional agricultural beliefs, as measured by ACAP scale scores, of freshman agriculture majors enrolled in a land-grant college of agricultural, food and life sciences.
2. Compare alternative or conventional beliefs of freshman agriculture students by major, gender, parent's education, and pre-college residence.
3. Compare the ACAP scale scores of freshman agriculture majors to ACAP scores of known groups of conventional and alternative agriculture.

Methods and Procedures

The population for this study was entering freshman in a college of agricultural, food and life sciences enrolled in a orientation course, AGED 1011-B Freshman Orientation. The instrument used was the Alternative-Conventional Agricultural Paradigm (ACAP) scale developed by Beus & Dunlap (1991). It contains 24 bipolar statements that portray the respective positions of the two paradigms: the conventional view of agriculture and the alternative view of agriculture. The ACAP instrument was administered during the second week of the semester to 75 students beginning in the fall semester of 1999 and enrolled in the freshman orientation class open to all majors of agriculture. Students enrolled in crops, soils and environmental sciences did not complete the survey.

The 24 items on the instrument are organized into six major dimensions: centralization vs. decentralization, dependence vs. independence; competition vs. community; domination of nature vs. harmony with nature; specialization vs. diversity; and exploitation vs. restraint. Some items are value oriented, while others focus more on beliefs about agricultural practices or issues. Some items present completely opposite positions, while the positions in other items were designed to accurately portray the contrasting positions held by the alternative or conventional agriculturists. Twelve of the 24 items are reversed in direction to help offset response set bias. A five-point scale is placed between each of the two contrasting positions with 3 representing a neutral position. Respondents were asked to circle one number per item. The possible range of total scores is 24 to 120 with a low score representing a strong endorsement of conventional agriculture and a high score representing strong endorsement of alternative agriculture. Figure 1 shows an example item from the ACAP instrument.

The abundance and relatively low prices of food in the United States are evidence that American agriculture is the most successful in the world	High energy use, soil erosion, water pollution, etc. are evidence that U.S. agriculture is not nearly as successful as many believe it to be.

1 2 3 4 5

Figure 1: Example item from the ACAP instrument.

Beus and Dunlap (1991) reported that the average internal consistency of the instrument ranged from .74 to .93 for different groups, with an overall average of .88. Construct validity was established through comparisons of known alternative and conventional agriculturists verified by the developers of the instrument. For the present study, a coefficient alpha reliability estimate of .78 was obtained. Data were analyzed using the SAR7 statistical package.

Findings

Students in nine of the 11 majors of the Bachelor of Science in Agriculture degree were represented in this study. Majors in common discipline areas were collapsed into departmental majors, (i.e. urban horticulture/landscape design majors and other horticulture majors), creating eight different majors for the study. Students majoring in poultry science represented the largest percentage of the freshman majors with 26.2% of the total. Students enrolled as agricultural and extension education and animal sciences majors each represented 16.9% of the total, while horticulture had 13.8% and turf management majors represented 10.8%. Entomology/pest management (4.6%) and food science (4.6%) majors were represented the least as majors of the freshman students in this orientation course.

Objective 1

ACAP scale scores ranged from 59 to 110 (Table 2) with the former representing strong endorsement of the conventional agriculture paradigm and the latter strong endorsement of the alternative paradigm. The mean ACAP score for all freshmen in agricultural, food, and life sciences was 79.47. Considerable variation in mean ACAP scores occurred across the various majors in the College, ranging from a low of 70.75 for agricultural economics/business students (more conventional than the known conventional agriculturists) to 86.67 for entomology/pest management students. The greatest variability occurred in the scores for animal science students with a range of scores from 69-110, followed by agricultural and extension education majors and turf management scores from 60 B 91 and 65 B 92, respectively.

Entomology/pest management majors (Mean=86.67) had the highest mean ACAP scale score. Higher ACAP scores are similar to that of known alternative agriculturists and signify these students are much more likely to endorse the alternative agriculture viewpoint. Likewise animal science majors (Mean =82.27), agricultural and extension education majors (Mean =80.45) and poultry science majors (Mean = 78.53) had great variation in the range of ACAP scores signifying opposing viewpoints in these majors. Agricultural business students had the lowest overall mean ACAP score (Mean =70.75), followed by turf management (Mean=76.57) and poultry science (Mean = 78.53). These scores are similar to known conventional agricultural viewpoints.

Table 1
Classification of freshman enrolled in an agriculture orientation course

Major	N	Percent
Agricultural Economics/Business	4	6.2
Agricultural & Extension Education	11	16.9
Animal Science	11	16.9
Entomology/pest management	3	4.6
Food Science	3	4.6
Horticulture	9	13.8
Turf Management	7	10.8
Poultry Science	17	26.2
Missing	10	
Total	75	100.0

Table 2
ACAP scale scores for freshman majoring in agricultural, food and life sciences

Major	ACAP Mean	S.D.	Range
Agricultural Economics/Business	70.75	2.21	68 - 73
Turf Management	76.57	8.98	65 - 92
Poultry Science	78.53	9.66	59 - 99
Agricultural & Extension Education	80.45	8.89	60 - 91
Animal Science	82.27	12.60	69 - 110
Food Science	83.00	13.08	68 - 92
Horticulture	83.89	6.71	75 - 96
Entomology/pest management	86.67	10.60	77 - 98
Total	79.47	9.61	59 - 110

Objective 2

Possible variations of the student's perspectives were examined by comparing ACAP scale scores and four background characteristics that might offer possible predictions of paradigmatic orientations: gender, pre-college residence, parent's educational level, and major (Table 3).

There were 29 (42.7%) male respondents and 39 (57.4%) female respondents in this study. Female students (Mean = 82.39) rated 7.11 points higher on the ACAP scale than did the male students (Mean = 75.28). To determine if a relationship existed between the ACAP score and gender, a correlation coefficient was computed on these variables. A moderate correlation (r = .30) was found between gender and ACAP scores (Davis, 1971) but explaining less than ten percent of the variance.

Traditionally, a majority of students studying agriculture have had a farm background. Although this situation is rapidly changing (Dyer and Breja, 1999), most of these students in this study had grown up on a farm or in a rural area. Prior to college enrollment, 40.6 % reported they lived on a farm, 24.6 % lived in rural, non-farm areas and 20.3% reported growing up in towns of 10,000-50,000. Only 8.7% reported living in towns less than 10,000 population while 5.8% lived in cities over 50,000 in size.

ACAP scale scores were more conventional for freshman living in towns under 10,000 in size. (Mean = 74.43). There were similar ACAP scores for students living in rural, non-farm settings and in cities of 10,000 to 50,000 in size. The freshman living on a farm reported the highest ACAP scores (Mean =82.71), which is a closer affiliation to alternative paradigm. Students growing up on a farm also had the greatest variability in ACAP scores than did other students. However, the correlation (r = -. 20) indicated a negligible relationship between pre-college residence and ACAP scale scores (Davis, 1971).

There was an almost equal distribution of the respondents' parents who had completed high school, some college, or a college degree. A very small percentage of these respondents had parents with less than a high school education. There were 38% of the respondents' parents with college degrees. There were 19 (29.23%) of the respondents' fathers and 17 (26.15%) of the respondents' mothers who had bachelor degrees and an additional 13 (20.00%) of the parents with advanced degrees. The ACAP mean scores of the respondents' fathers ranged from 59-110 with those having less than a high school education reporting the highest ACAP mean score of 92.00. Those fathers with a bachelors degree reported the lowest ACAP mean score (Mean= 77.84). A negative but low relationship (r = -. 11) was found between ACAP scores and the father's level of education.

The mean ACAP scores of the respondents' mother's educational level ranged from 66-110. These scores mirrored those of the fathers with the highest ACAP scores being reported by students whose mothers had a high school education (Mean= 82.63) and the lowest ACAP score reported by students whose mother had a bachelors degree (Mean = 77.82). There were very similar ACAP scores for the students whose mothers had an advanced degree. The mother's educational level also had a negative and low relationship (r = -. 23) with the ACAP scale score (Davis, 1971).

Table 3
ACAP scale scores for agriculture majors listed by gender, pre-college residence, and educational level of their parents

Gender	N	Percent	Mean	S.D.	Range
Male	29	42.65	75.28	7.20	59-90
Female	39	57.35	82.39	9.94	66-110
Missing	7				
Pre-College Residence					
Farm	28	40.57	82.71	9.76	68-110
Rural, Non Farm	17	24.63	78.59	11.21	59-96
Town Under 10,000	6	8.70	74.33	6.38	66-85
City 10,000-50,000	14	20.28	76.43	5.54	68-88
City Over 50,000	4	5.80	79.50	13.92	67-96
Missing	6				
Education of Father					
Less than H.S. diploma	3	4.62	92.00	18.00	74-110
H.S. diploma or GED	20	30.77	80.30	9.22	60-99
Some College	16	24.62	78.56	8.40	66-99
BS Degree	19	29.23	77.84	9.36	59-98
MS or Ph.D.	7	10.77	84.29	9.43	71-96
Missing	10				
Education of Mother					
Less than H.S. diploma	0				
H.S. diploma or GED	19	29.23	82.63	7.60	69-99
Some College	23	35.38	80.30	10.39	66-110
BS Degree	17	26.15	77.82	11.36	59-98
MS or Ph.D.	6	9.23	78.00	8.89	68-89
Missing	10				

Objective 3

To determine if freshman agricultural majors were similar in their viewpoints with those of known conventional and alternative agriculturists, a comparison was made of the mean ACAP scores of these groups. There were nine groups used in the original research, which were classified as either alternative agriculturists or conventional agriculturists. Known alternative agriculturists included members of a state association of permaculture, members of a coalition for alternatives to pesticides, and certified organic farmers. Conventional agriculturists included Farm Bureau members, chemical dealers, and aerial pesticide applicators. A statewide farmer sample was also used as intermediate between the known groups of alternative and conventional agriculture; however, their responses are more similar to the conventional group than to the alternative groups. For a complete description of this research, see Beus and Dunlap, 1991. Additionally, senior students in the college were also used as a comparison group with data obtained from a previous study.

The mean ACAP score of the freshman agriculture majors (Mean = 79.5) was basically the same as senior agriculture majors and almost the same as the statewide farmer sample (Mean =80.9) but slightly higher than the known conventional agriculturists (Mean =73.3). The alternative agriculturists had an overall mean score of 102.1. The means and range of scores are shown in Table 4.

Table 4
Means scores of the alternative agriculturists, conventional agriculturists, seniors and freshmen majoring in agriculture

Group	Mean	S.D.	Range
Alternative Agriculturists	102.1	14.0	46-120
Statewide farmers	80.9	11.6	37-114
Conventional Agriculturists	73.3	11.7	41-105
Senior Agriculture Students	79.1	11.5	49-118
Freshman Agriculture Students	79.5	9.6	59-110

Conclusions and Recommendations

Overall, these freshman agricultural majors adhere to the conventional agricultural paradigm. They have similar scores to those of statewide farmers and conventional agriculturists. While the ACAP scores varied more widely, the freshmen held the same views as senior students in the college. The conventional agriculturists still largely agree that maintaining rural communities is essential to the future of agriculture, see farm tradition and culture as essential to good agriculture, and are more likely to see farming as primarily a business rather than a way of life. However, there was wide variation of these viewpoints within majors.

The agribusiness, turf management and poultry science majors in this study hold more of a conventional perspective of agriculture and would thus endorse conventional agricultural practices. By comparison, entomology/pest management and horticulture majors tended more toward the alternative agriculture paradigm. Agricultural and extension education majors tend to hold more conventional views. Animal science majors reflected the greatest variability in the range of scores. Variation in the scores by the different majors indicates that these freshmen have diverse viewpoints on the agricultural paradigms

Differences in the pre-college residence, and parent's educational level were low or moderate relationships. However, males tended to favor conventional agriculture when compared to females. This trend follows other research, which indicates that females are more likely to endorse more strongly than do men environmental protection, appropriate technology, risk avoidance, and other issues closely related to the alternative agriculture paradigm (Blocker & Eckberg, 1989). However, with only a seven-point difference in the means, one could conclude that any differences might be a function of choice of major by gender. Students with lower ACAP scores tended to have college-educated parents.

Based upon the findings of this research, the following recommendations are made:

1. Further study is needed to determine if students select majors based on their beliefs of the paradigm and how this viewpoint is developed.
2. Continuing research is needed is needed to determine the alternative and conventional paradigms of entering students, if a student's view of the paradigms changes over a period of time, and if faculty influence student viewpoints.
3. Further study is needed to determine if the alternative or conventional beliefs of agriculture faculty are similar to agriculture majors.
4. Further study is needed to determine if the alternative or conventional beliefs of non-agriculture majors are similar to agriculture majors.
5. Further study is needed to try to explain how educational level influences the beliefs in the alternative or conventional paradigms.
6. A greater philosophical question for study is whether colleges of agriculture are exposing students to differing viewpoints regarding production practices in agriculture.

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Perceptions of Freshman Agriculture Majors of Alternative Versus Conventional Agricultural Paradigms

A Critique

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Contribution and Significance of Research

The results of the study describe well the beliefs of entering freshmen in one college of agriculture as related to conventional and alternative perceptions of agriculture. While some implications may be inferred, the results do not address directly the important question stated by the author, namely, "Are changes needed in the curriculum of agricultural colleges?"

Procedural Considerations

The research was designed well and carried out effectively, even though students in crops, soils, and environmental sciences were not included. While ACAP means obtained could be associated with conventional or alternative paradigms, it should be noted that the range in scores and the large standard deviations in six of the eight groups reflected the spread in the beliefs by the students in each group. If the study is replicated, could the five-point scale used with the 24 bi-polar statements be expanded to a seven or nine-point scale? Doing so provides a chance to respond more closely to marking along a continuum, as is commonly done when using semantic differential scales.

Questions for Consideration

Because the freshmen tended to mirror the Alternative vs. Conventional Agricultural Paradigm (ACAP) scores of statewide farmers and conventional agriculturalists, and because 65.2% of them had come from farms or rural, non-farm areas, should we replicate this study in a college of agriculture where a higher percentage of freshmen students come from urban areas in order to determine if there is consistency?

Because the research was conducted on first year agricultural majors and attempted to identify factors at work that caused them to bring to college the viewpoints that they held, it is important to carry out the author's Recommendation #2, that research is needed to determine if the college faculty influence students' viewpoints over a period of time until graduation. Can we do so, but factor out other contaminating factors, such as viewpoints contributed by student peers and increased accessibility to activities of various public interest or pressure groups? Possibly, additional research should focus on the whole college experience, and not just the influence of the faculty. However, probably more important, in terms of further research, is following the author's Recommendation #6, namely, "A greater philosophical question for study is whether colleges of agriculture are exposing students to differing viewpoints regarding production practices in agriculture." Should we not be doing so?

Curriculum Model for Distance Education AgEdS 315 Leadership and Group Dynamics

Poster Abstract

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Introduction

The objective of this project was to restructure an on-campus course, Leadership and Group Dynamics, for distance delivery. It was part of a USDA Challenge Grant Curriculum Project entitled, "A Curriculum Model for Undergraduate Distance Education in Agriculture Using Technology". The Challenge Grant project consisted of converting six courses for distance delivery in the disciplines of agricultural education, animal science, agronomy, agricultural system technology, and economics. In addition to curriculum development, the project included faculty development activities and collaboration with North Carolina Agricultural and Technical State University.

Project activities included developing a course packet of PowerPoint visuals, placing course content on the World Wide Web using WebCT, developing videotapes to enhance discussion of key concepts, and delivering the course to students at a distance.

Course Development

The course was restructured into seven units, plus an introduction and orientation session. The units contained from two to seven topics. Forum discussions, questions to be addressed, references, notes to accompany the course packet, and applications were written for the topics. Internal and external links were added to the web notes.

The content was written using MS Word, which was converted to html and uploaded into WebCT. Student assistants made minor formatting changes in the content after uploading into WebCT to create the desired appearance and permit easy viewing and study.

One concern in teaching on-line was to have interaction with and among students. To provide opportunities for interaction, 13 threaded discussions were created. These consisted of questions, scenarios, and situations in which the students were required to respond to instructor's postings, the postings of other students, or both. In addition to the threaded discussions, virtual teams of students were formed to function together in solving assigned problems. Electronic mail was also used for interaction with students and students were required to submit most of their assignments via electronic mail. Students were required to submit bi-weekly journals and a portfolio at the end of the semester. Seven 2-hour sessions were conducted over the Iowa Communications Network (ICN), with 2-way video/audio capabilities, to apply concepts and answer questions.

Challenges

The greatest challenge was to plan and develop the web notes. This was the most time-consuming phase of the project. It was difficult to write notes in a concise and coherent manner without losing the personal sharing of experiences and examples, which are part of face-to-face classes. It is much easier to conduct a face-to-face lecture/discussion than it is to covey the concepts in written form.

A second challenge was to develop realistic applications that were appropriate for web delivery. An application was written for each of the 31 topics. The intent of the applications was to help the students internalize the concepts by relating the concepts to real life situations. Several self-assessments and goal setting activities were included in the applications. Students' responses to the application were required as part of their bi-weekly journals.

Results and Evaluation

The course was offered during the fall semester 1998 with 13 students enrolling. About half of the students were off-campus and were employed full-time. The visuals that were developed as part of the project and instructional information on accessing the web were distributed to the students in a printed course packet. The content was delivered using visuals, web notes and Internet links, the ICN fiber optics network, and the textbook.

Students completed an anonymous on-line course evaluation after grades were submitted. Students were asked to evaluate all delivery modes and activities in the course as to how helpful they were in learning the concepts. On a 5-point scale with '5' representing excellent, mean ratings of 4.08 and 4.46 were attained for the course packet (visuals) and web notes, respectively. The mean rating for an assignment consisting of interviewing a leader and writing an analysis of the individual's leadership tendencies, activities, and philosophy had a mean rating of 4.15. The threaded discussions received a mean rating of 3.46.

The students were also asked to rate factors representing problems that they encountered in completing the course. A rating of '1' indicated that they experienced no problems, with '5' great problems. Of particular interest was to evaluate the use of WebCT and limited face-to-face instructor contact to see if they presented problems to the students. The mean ratings for both of these factors were 1.54, indicating that the students experienced no problems. The mean ratings for all other factors were less than 1.50.

An assessment was made of the students' satisfaction with the course. Factors accessed were whether the content was challenging, met their expectations, had relevant and realistic requirements, and an overall rating. The mean ratings for all factors were above 4.00 (good) with the overall mean rating for the course of 4.08. Student evaluations of the instructor ranged from 4.15 to 4.62 on all factors accessed.

The evaluation asked the students to report the amount of time they spent on the course each week. The mean was 12.96 hours per week, which is above the target of three hours in-class and six hours out of class for a face-to-face 3-credit class.

Conclusions

Based on experiences gained from the project, the following conclusions were reached. Content can be effectively delivered via the web. It is a time intensive process of planning and converting to web-based delivery; however, with WebCT, one does not need extensive programming skills to make the conversion. There are more opportunities available using web-delivery to engage the students in the content and to increase interaction. The interaction with and among students for the web delivered course was estimated to be three times greater than in face-to-face delivery.

Models for Integrating Computer Technologies into Agricultural Student Teaching Programs

Poster Abstract

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Introduction

Many would argue that student teaching is the most important component of any teacher education program in agriculture. A successful student teaching experience requires a team effort involving the student teacher, the cooperating teacher, and the university supervisor. The success of this three-way relationship is dependent upon substantive communication. Regular communication between the student teacher and the university supervisor and the cooperating teacher and the university supervisor often presents the greatest challenge. Conflicting schedules and travel difficulties frequently reduce the time that university supervisors are able to spend with student teachers.

The purpose of this project was to develop cost-effective sustainable models for integrating computer technologies into agricultural student teaching programs. The primary emphasis was on using computers as communication tools with a secondary emphasis on enhancing access to teaching materials and improving the quality of teaching materials used by student teachers.

Methods

Five internship programs that had reputations for successfully integrating computer technologies into their program were identified by surveying academic deans in agriculture and heads of agricultural education departments in the United States. Based on the results of the survey, Fort Valley State University, Oklahoma State University, Texas A&M University, the University of Florida and Washington State University were selected for study. Four of the five internship programs were agricultural student teaching programs. Greg Miller or Wade Miller visited each of the five programs and collected data to describe the approach used in the program, determine its advantages and disadvantages, analyze the cost effectiveness of the approach and determine if an educational theory or philosophy undergirded the approach. The findings from the five case studies influenced decisions about the approach to take in the agricultural student teaching program at Iowa State University.

At Iowa State University, the use of desktop videoconferencing (DVC) to supervise student teachers was evaluated. During the spring semester of 1999, one half (n=9) of the student teachers experienced supervision facilitated by DVC. Student teachers in the control group received three on-site university supervisor visits while students in the DVC group received two on-site university supervisor visits and two DVC supervisory experiences. Student teachers in the DVC group sent a videotape of themselves teaching a class and the corresponding lesson plan to their university supervisor. The university supervisor viewed the tape and took notes. To conduct the post-observation conference the university supervisor and the student teacher initiated a conference using Microsoft NetMeeting and a QuikCam camera. Attitudes of all student teachers, cooperating teacher, and university supervisors toward the use of DVC were measured before and after student teaching. In addition, student teachers' level of reflective thinking was measured after student teaching. Finally focus group interviews were conducted with all student teachers to gain deeper insights into the experiences of student teachers in both groups.

In addition to DVC a web site was developed for the student teaching program in agricultural education at Iowa State University. The web site included the student teaching handbook, the university teacher education handbook, a list of e-mail addresses for student teachers, cooperating teachers and university supervisors and links to agricultural web sites. The site also provided access to Web Ct for asynchronous discussion among student teachers.

Results to Date

Data collected from the five internship programs studied by the project staff are being organized into a manuscript for publication in a teacher education journal. These programs had been using E-mail and Internet tools to facilitate asynchronous discussion. DVC had seen limited use in these program and no evaluation data had been gathered to determine its usefulness. Persons interviewed indicated that the primary motivation they had for using computer technologies in their internship programs was to stay current with technology. In addition, these same persons had difficulty identifying an undergirding philosophy or educational theory guiding their approach to integrating computer technologies into the internship program. Fort Valley State University had experienced success in supervising student teachers using a statewide compressed video network referred to as G-SAMS. Their experience provided a stimulus for Agricultural Education faculty at Iowa State University to experiment with similar technology in Iowa.

Student teachers at Iowa State University in the Spring of 1999 were undecided about DVC before and after student teaching. In addition, student teachers who received supervision facilitated by DVC were no more positive or negative toward DVC at the end of student teaching when compared to those who received traditional supervision. Cooperating teachers and university supervisors had positive attitudes toward DVC before and after student teaching. Student teachers receiving traditional supervision and those who received supervision facilitated by DVC were no different on their student teaching grade or in the level of reflective thinking that they achieved. At Iowa State University, DVC was determined to be an effective communications tool, but a lack of adequate technology resources in secondary schools is a serious barrier to wide spread reliable use of DVC.

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, Agricultural Telecommunications Program, under agreement No. 97EATP10207. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Teaching Improvement for University Agriculture Faculty

Poster Abstract

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Professional Development of Faculty

The College of Agriculture, Food and Natural Resources (CAFNR) at the University of Missouri has received recognition for undergraduate and graduate teaching excellence. This recognition has been achieved through the dedicated efforts of numerous faculty and administrators who have demonstrated a continuing commitment to effective teaching.

Learning to teach for many university faculty has been a trial and error process that requires tremendous energy to develop courses and teaching techniques. In most cases, new faculty have had little to no formal preparation for teaching or acquaintance with the principles of student learning that are important in planning educational programs. Experienced faculty continue to review and adopt new teaching techniques and integrate current technology as a continuous improvement process. In order to provide leadership on the University of Missouri campus in undergraduate and graduate teaching, the CAFNR Teaching Scholars Program was designed to support the professional development of faculty in the college.

Continuous Development

Recognizing that the process of teacher development requires time, education, and sustained effort, the CAFNR Teaching Scholars Program was initiated in February, 1997. The purpose of the program was to provide an internal support system to help faculty at different stages in their professional development as teachers. Faculty beginning their careers as well as those with an excellent teaching reputation benefited from participation in the CAFNR Teaching Scholars Program. By participating in the program, faculty were better prepared to successfully interact, motivate, and challenge students in their undergraduate and graduate classes.

Program Description

Twelve faculty members were selected to participate in the initial CAFNR Teaching Scholars Program. Retreats and conferences (both on-campus and outside the state) motivated faculty to excel in their teaching and also helped build a sense of esprit de corps among the participants.

Programs for Teaching Scholars were held on a monthly basis, and were structured to accommodate large group and small group activities and interaction. Meetings focused on development as an effective teacher and support for each fellow Teaching Scholars during the process. Discussion topics included learning styles, evaluating teaching, peer review of teaching, building a teaching portfolio, and course development. Speakers with a particular expertise in learning, teaching, and technology conducted workshops and/or discussion sessions to assist the CAFNR Teaching Scholars.

Activity Plan

The Teaching Scholars Program was self-directed by the faculty participants. Following is a list of activities that each Teaching Scholar completed during the 15-month program:

Level 1 – Complete all activities:
- Develop a Teaching Portfolio
- Complete a Peer Review of Teaching
- Conduct Student Course Evaluations (mid-semester and end-of-semester)
- Maintain a Personal Journal of Teaching
- Be an Active Participant in Teaching Scholars Activities

Level 2 – Select at least one of the following activities to complete:
- Develop a Personal Teaching Library
- Present a Workshop on Teaching
- Write a Journal Article on Teaching

Level 3 – Select at least one of the activities to complete
- Develop a Course Web Site
- Conduct a Research Project on Teaching
- Submit a Teaching Grant

Program Benefits

Dr. Jaclyn Card, Associate Professor of Parks, Recreation and Tourism and a member of the initial CAFNR Teaching Scholars reported: "This is the most rewarding experience I have encountered in my years of higher education. My teaching has improved and the amount of energy I expend on teaching has increased tremendously. Through the CAFNR Teaching Scholars Program, I have learned that a fine line exists between the act of teaching and the act of learning. Teaching entails the process teachers and students go through to experience the joy of learning."

Faculty Incentives and Rewards

Faculty completing the Teaching Scholars Program received a $2,000 increase in their base salary above any other merit adjustment. Funds were also appropriated for each Teaching Scholar to spend on resources to support teaching and learning activities of particular interest. Up to $1000 was made available for participants to purchase teacher references, classroom teaching materials, travel costs for attending teaching improvement workshops, or purchasing teaching aids for classroom use.

An Evaluation of the Fall Conference for Leadership and Professional Development: A Triangular Approach

Poster Abstract

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The Fall Conference for Leadership and Professional Development, for five years, has been a successful opportunity to touch the lives of many high school freshmen that are being introduced to the FFA and its leadership development function of the agricultural education curriculum. The focus of the conference is to give students a better understanding of what it takes to be an effective leader and the many opportunities available to them through FFA and agriculture. However, the uniqueness of this leadership conference is its multi-faceted approach to reaching students, on the collegiate and high school levels. The conference is totally designed, developed, implemented and evaluated by undergraduate students in Agricultural and Extension Education 311 and 412 as a "living-lab". High school freshmen in the agricultural sciences attend the conference for a full day of intensive preparation in life-long leadership skills. High School Agricultural Educators attending the conference participate in an intensive education inservice workshop taught by an expert in educational processes and technologies.

The theoretical framework is imbedded in the intracurricular philosophy of agricultural education. This intracurricular nature aids in the development of the whole person. One piece of that philosophy is leadership development, which manifests itself, in part, through the FFA. FFA members should therefore be exposed to leadership development at the earliest time possible. The Fall Conference for Leadership and Professional Development is offered by prospective teachers to freshmen FFA members. Therefore, is the conference meeting the goals and objectives of leadership development as philosophized by agricultural education and the FFA?

This study will evaluate student and teacher participant perception of the conference to be sure that the goals of the conference are being met. Student participants received evaluation forms in their final workshop of the conference in October 1999. Therefore, a 100% response rate was reached. Teacher participants were mailed survey questionnaires. Follow-up is needed to assess whether the Fall Conference for Leadership and Professional Development is meeting the goals of providing an atmosphere to foster leadership and professional development among rural youth in Pennsylvania. The need to provide an organized and detailed summary of participant perspectives is also necessary to keep sponsors and administrators informed of the conference progress.

Thinking in Classrooms

Poster Abstract

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Brief Description

Communication is the basis for all relationships. A student and a teacher must master this art of communication in order to be successful in the teaching-learning-experience. Without the opportunity to think at higher cognitive levels, students cannot engage in these processes.

In order to assess what students are thinking in class and measure the level that professors teach higher-order thinking, four professors and scholars from the Pennsylvania Governor's School for the Agricultural Sciences were randomly selected for this study.

In 1950s Benjamin Bloom developed a system for organizing thinking skills, which is commonly called Bloom's Taxonomy. According to Bloom (1956) the are six main levels of cognition: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom's Taxonomy is a hierarchy in which each level of cognition must be mastered before it is possible to move to a higher level. In addition, the Florida Taxonomy of Cognitive Behavior (FTCB), created by Webb (1968), and based on Bloom's Taxonomy (1956), was used to measure the potential level of cognition reported by professors and the level of cognition reached by students during class.

Professors in this study taught 46% of the time at the knowledge level of cognition. On the other hand, the most common type of thought displayed by students in class was "nonsense or unrelated thoughts (46%). The least frequently utilized cognitive levels by professors were application (7%), analysis (8%), synthesis (9%), and evaluation (2%). In addition, students concentrated an average of [illegible]% of their thoughts in class at the analysis level, 9% at the synthesis level, and 2% at the evaluation level. However, students reported 19% of their thought s to be related with deeper learning or questioning attitude. Whithin that category of thought, students reported 40% (Analysis) of their higher-order thoughts.

Professors need to set goals at the start of class, reorganize material constantly, evaluate students and procedures, and focus on more analytical behaviors. Students, on the other hand, should discipline themselves to pay attention to class without being diverted by outside factors that may hinder their learning experience.

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Biotechnology and Agriscience Research Course and Curriculum Development

Poster Abstract

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Introduction

Today's biotechnology is being used to develop agricultural products and to improve existing plant and animal species. Agricultural scientists, technicians and consumers need to understand agricultural biotechnology in order to conduct research and to make informed decisions. High school agricultural education programs can provide young people the information and training they need to pursue related careers or to become informed decision-makers.

Program Phases

In 1994, North Carolina agriculture education teachers indicated in a North Carolina Department of Public Instruction (NCDPI) survey that agricultural biotechnology should be taught in North Carolina high school agricultural education programs. In 1996, a committee of industry, business and education personnel was formed, under the leadership of North Carolina State University, to determine the competencies and curriculum that should be taught in a course titled Biotechnology and Agriscience Research. This committee referred to the "National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians" to determine the skills needed for an entry-level employee in agricultural biotechnology.

During the 1998-1999 and the 1999-2000 school year, the Biotechnology and Agriscience Research course was piloted in eleven schools across North Carolina. A grant was received from the North Carolina Biotechnology Center to buy supplies for the pilot labs and teachers were also invited to participate in their equipment loan program.

The pilots and project director accomplished the following objectives:

1. Taught basic biotechnology and current agricultural applications of biotechnology in North Carolina high schools.
2. Introduced approximately 50 teachers to the labs/curriculum in the summer of 1999.
3. Piloted the curriculum materials and lessons and provided pilot teacher training at NCSU.
4. Collected data to access student performance.

To achieve the objectives:

- Trained pilot teachers in workshops at NCSU.
- Trained pilot teachers in workshops at Carolina Biological Supply Co., Inc.
- Provided teachers with access to equipment and lab supplies to implement biotechnology

lessons.

- Worked with the DPI and pilot sites to complete the course blueprint.
- Worked with consultants to develop matching curriculum materials.

During the course development process in North Carolina, the pilot teachers and the curriculum committee realized the need for a comprehensive and up to date agricultural biotechnology curriculum. The National Agricultural Council was interested in supporting the development of such a curriculum. Smith and Strozier consulting firm was identified as having developed biotechnology curriculum and having assisted with various high school agricultural projects in North Carolina. Current agricultural applications of biotechnology were integrated with employee skills identified in the "National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians" and the course competencies of the North Carolina Biotechnology and Agriscience Research course to create the framework for the "Biotechnology for Plants, Animals, and the Environment" curriculum. This curriculum was piloted in North Carolina and nationwide by the National Agricultural Education Council in 1999.

An intensive four day curriculum training workshop was sponsored by the North Carolina Biotechnology Center and conducted by North Carolina State University for agricultural and biology teachers in North Carolina in July 2000.

Results To Date

The goal of this project was to expand biotechnology education among Agricultural Education students in North Carolina. During the 1998-1999 school year, 98 students were enrolled in the Biotechnology and Agriscience Research course at pilot schools. An additional 295 students took part in one or more of the biotechnology labs integrated into an existing agriculture education course. In the summer of 1999, pilot teachers conducted a teacher workshop at the annual N.C. Agricultural Education Summer Conference to introduce over 50 teachers to the course and new curriculum. In the fall of 1999, the pilot teachers and project director presented an introductory NATA workshop to showcase the curriculum to over 100 teachers nationwide. In March 2000, the National Agricultural Education Council conducted a national train the trainer workshop. The curriculum is now being sold and distributed by the National Council. The project director has completed the development of 500 multiple choice questions to be used for end of course student assessment in North Carolina.

Implications

In this project, many partners of education have come together to deliver biotechnology education to agriculture education students. The purpose of agriculture education is to educate and train future leaders and employees of the agriculture industry. The success of these students will depend on their knowledge of current technology including biotechnology. In turn, the biotechnology industry will depend on the agriculture industry to understand and utilize biotechnology products and processes. Biotechnology education should and is an integral part of agriculture education.

Future Plans

The project director is in the process of conducting research to identify variables related to the adoption of the course and curriculum in North Carolina. By identifying these variables, North Carolina will be able to develop and conduct more effective activities that will encourage the adoption of the course and curriculum.

The First Annual Texas Junior FFA Leadership Conference

Poster Abstract

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Sam Houston State University
Carl G. Igo
Southwest Texas State University

Introduction

During the 1999 – 2000 school year Texas had 5,596 Jr. FFA members in 462 chapters. To be a member of the Jr. FFA the student must be involved in the local FFA Chapter and pay dues of $2.50 to the Texas FFA Association. These members are expected to participate in the local program of activities and manage a Supervised Agricultural Experience Program.

In order to capitalize on the energy and future of the organization the Texas FFA Association State Officers with support from the state Agricultural Education Staff developed the First Annual Jr. FFA Leadership Conference. This conference was created as a day camp complete with leadership development, educational programs and physical activities.

How It Works

State Jr. FFA dues and a pre-registration fee of $10 per member were used to cover the expenses of the program. These expenses included the rental of a dining hall and campsite, one mid-day meal, snacks, T-shirts for each participant, decorations, and State Officer expenses.

The State Officers and State Agricultural Education Staff met during the FFA Convention in July to develop guidelines and the program for the conference. Dr. Steve Forsythe, State FFA Executive Secretary, developed a rough draft for the program created a method for publicizing the event. The officers then offered their suggestions and finalized the program and activities for the day.

When the program was finalized a summer camp in Kerrville was selected and reserved as the site for the First Annual Jr. FFA Leadership Conference. Officers then organized into teams to develop T-shirts, finalize the activities, manage the publicity and registration and to develop the final format of each session.

The officers met the afternoon prior to the conference to review the program and practice each of the sessions. Several advisors and parents were recruited to help monitor registration and each session during the day.

Results

The State FFA Officers and State Agricultural Education Staff felt that the program was successful in that it brought everyone together for a full day of education about Agricultural Education and FFA in Texas.

The Jr. FFA members attending the conference developed an understanding of FFA history. These students also developed an appreciation for the State FFA Officers leadership abilities and the agricultural education program. An excitement of becoming an FFA member in High School and participating in a full range of FFA activities was created with high expectations for their future.

Future Changes

Several changes will be made for next years' officer training and the leadership program. Concerns were found on the flexibility of the schedule, which inadvertently created too much time between program segments. The lack of a rigid, well timed schedule created some conflict with the younger students who lacked the maturity and time management skills to return at scheduled times.

Another concern was that the State Officers managing the program were not trained well enough to deal with the younger students. A training session with knowledgeable people to help them understand the younger students is planned. Another recommendation is that two or three people with experience with elementary level students be involved to monitor the students during the activities.

Thirdly, changes to the program need to be considered. It is suggested that the program focus largely on goal setting and less on fun activities. Too much effort was made to make the program fun and physically entertaining and not enough effort was spent dealing with educational or goal setting activities.

MORE POWER!!! [*Grunt, grunt*]
Another Tool for the Pre-Service Toolbox

Poster Abstract

Edward Franklin
University of Arizona

Introduction

Pre-service teacher education students are introduced to and encouraged to develop a wide array of teaching tools to add to their instructional arsenal. Due to the diversity of our curriculum, variability of delivery methods is essential to the success of student learning. Educational reform initiatives (A Nation at Risk, 1983; The Unfinished Agenda, 1984) have called for educators to develop methods for students to learn more effectively and efficiently. Responding to the need of increasing "science literacy", agricultural education accepted the challenge of integrating science concepts into the agriculture classroom. However, adopting to change has been a slow process. Whent (1992) reported that agriculture teachers were reluctant to adopting the concept of science integration into existing agriculture programs for fear of threatening the program. Although Thompson (1998) recommended that undergraduate students should receive instruction on how to integrate science into the agriculture classroom. The National FFA Organization has recognized the importance of agriscience and has adopted programs to promote scientific agriculture in secondary agricultural education (Duval, 1988).

The agriscience fair as a career development event has gained acceptance in various states and at the national level. This activity recognizes students studying the application of scientific principles and new technologies. To reach the national level, students must participate at the state level.

Methodology

Idea of conducting a state level Agri-Science Fair at the Oklahoma State FFA Convention was discussed with approved by the state FFA advisor. A service-learning grant was obtained to provide funding for the project to cover the costs of duplicating fliers, and entry information, mailing expenses, travel, and awards. Lab time was dedicated to teaching the concept of integrating agriscience activities into the traditional agriculture classroom. The agriscience fair activity was introduced to the students and their role and participation was presented. Pre-service students enrolled in AGED 3203 would serve to mentor high school students interested in developing an agriscience project. A web page was developed to provide information and ideas to agriculture teachers and FFA members. Two high school agriculture programs accepted an invitation to have AGED 3203 students visit their classes and conduct presentations on developing agriscience fair activities. The national FFA guidelines were adopted for the state level competition. Entry forms and guidelines were mailed out to all agriculture programs in the state. Service learning funds paid for transportation costs, printing & postage and awards. AGED 3203 students practiced developing their own topics into agriscience fair activities utilizing the steps of scientific investigation. Presentations were made during lab times and peer evaluations were conducted. A web page was created with various links to existing science fair sites to provide ideas and answer questions.

Results

Eight student entries were received. As a part of their final exam activity, AGED 3203 students interviewed each agriscience fair participant and evaluated the seven displays. As a follow up, all AGED 3203 students prepared reflection papers describing the individual entries and their strengths and weaknesses. Suggestions for improving each research project were solicited as well as methods for individual future teachers to integrate such an activity into their own agriculture programs. FFA participants were presented with plaques during a special session of the state convention. 38 agriculture teachers attended a workshop for developing agriscience fair projects during the 1999 summer conference for agricultural education instructors. The activity will be continued as regular career development event for the Oklahoma State FFA Association. Six Oklahoma entrees competed at the national agriscience fair at the National FFA Convention in Louisville, Kentucky. Four entries from Oklahoma placed in the top three of their respective categories and divisions.

Implications

Agricultural education teacher training institutions should look to adopt the agriscience fair activity or offer to conduct it for their state associations and utilize it as an experiential activity for pre-service training of future agriculture educators. What better way to train a future teacher to prepare students for such an activity than to immerse them into the process of organizing, conducting and evaluating a university-sponsored event.

Future Plans

The state association and the university agricultural education department plan to continue to conduct the agriscience fair as part of the state FFA convention activities. Efforts to secure external funding for award sponsorship to provide assistance for student travel to the National FFA Convention and the national Agriscience Fair are underway.

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A Learning Assessment Tool for a New Natural Resources Curriculum in Utah's Agricultural Education Program

Poster Abstract

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Introduction

The Performance Based Skills Certification for Natural Resource Management is designed to provide for the assessment of program completer skills in the areas of forestry, rangeland resources, fish and wildlife management, natural resource policy/regulation implications and recreation.

A natural resources emphasis area (curriculum) was added to the Agricultural Education Program in Utah high schools in 1998. The Utah State Office of Education contracted agriculture and range educators at Utah State University (USU) to develop a performance-based skill certification assessment for this curriculum. Twenty-one competency standards, with supporting objectives, were developed by teachers in the Agricultural Education Program. Competency areas include: range, forest, recreation, fisheries/wildlife, soil, and watershed management; ecological concepts; environmental ethics conflict management; energy resources; waste disposal; land classification and planning; inventory and monitoring methods; business and economic principles; and career opportunities.

Project Objectives

1. Identify natural resource competency areas.
2. Solicit natural resource teachers' problem areas, conditions, and methods in relation to identified natural resource competencies.
3. Select, model, and develop problem centered assessment procedures applicable to performance based skill development.
4. Provide for complete performance

Procedure

In 1996, an Agricultural Education-Natural Resource Management Committee was assembled to determine the objectives and competencies necessary to prepare students for careers in natural resources. The committee arranged a program planning and curriculum development guide to assist the secondary agricultural science and technology instructors in planning for their teaching of Natural Resource Management. After 1998, a grant was established to write the Performance Based Competency Assessment for Natural Resource Management.

In August of 1998, work began on refining and validating the standards and objectives. Soon after an activity design format was developed. It is important to note that the objective of the project was not to develop complete instructional units but an assessment guide to test the understanding of material previously instructed. It does not replace the teacher or the teacher's expertise. The assessments can be adapted to the location, materials, and individual students that teachers are provided with.

The guide is divided into 21 sections. Each section addresses a different facet of natural resource management, such as ecology, natural resource management, forestry, etc. The performance assessment activities allow students to hear from resource specialists, perform fieldwork, practice public speaking skills, develop teamwork skills, and investigate/analyze current natural resource topics. Where ever possible the activities provide Utah specific examples. Also, some activities have been designed to help prepare students for FFA activities.

Assessment Process Outline

The assessment guide is divided into standards. Twenty-one standards were defined through curriculum review and industry validation. Each standard is further supported by a series of objectives. The objectives become the assessment point in determining student learning. Each standard had a varying amount of objectives.

The assessments of each standard follow a uniform set of headings. Teacher familiarity with the assessment process is key to the successful implementation. The following headings were designated for the Natural Resource Management assessment guide.

Standard- A 5000-series number is used for Natural Resource Management. This describes the subject the standard addresses.

Objective- These items describe the specific areas of the standard that are to be met. Objectives were written at the highest practical level of cognition.

Concept- A statement designed that orientates both the teacher and student to the general idea of the standard and objective.

Background-Not a teaching unit but provides enough information sufficient to help provide a basic understanding of the topic.

Teacher Responsibilities- Outlines what the teachers must do to prepare and conduct the assessment.

Materials/Resources- Items needed to conduct the assessment as proposed.

References- Suggested/recommended texts, videos, websites etc. where the teacher can find more information or activities.

Activity/Procedure- a detailed step by step list of instructions and procedures to allow for the successful completion of the assessment.

Performance Assessment- A detailed description/criteria of what is expected of the student to aid

Teacher In-Service Activities

The teachers involved in the Agricultural Education Program were introduced to the competencies, objectives, and activities at a 3-day workshop in August 1999. Teachers toured a wildlife refuge, a National Forest, and a private ranch as part of these tours activities were demonstrated as well as showing the potential for partnerships with various state and federal agencies. Teachers also practiced software application in a computer lab setting.

Follow Up Activities

A website http://www2.aste.usu.edu/nr/ was established to inform teachers of updates in the performance assessments as well as provide resources and links to other natural resource related websites. Teachers can also e-mail questions or comments about the Natural Resource Project. A two-year review of the project will be conducted. Students involved in natural resource program will also receive a pencil/paper multiple choice that parallels the standards and objectives to verify student performance is equal to student cognition.

Teaching Portfolios: A Strategy to Improve Learning and Teaching for Pre-Service Teachers in Agricultural Education

Poster Abstract

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Introduction

Teaching portfolios have been used in the Agricultural Education Program at Oregon State University to help pre-service teachers reflect on their knowledge about teaching and learning and improve their ability to convey this knowledge. The portfolio is an indication of the quality of work completed by the pre-service teacher. Various components of the portfolio reflect the pre-service teacher's knowledge of subject matter, pedagogy, curriculum, students, and schools. The content of the portfolio includes revised papers and projects completed as a part of the pre-service teacher's coursework. It also includes worksamples, videotapes of teaching, a video summary, and materials documenting additional professional activities in agricultural education. Hurst, Wilson, and Cramer (1998) defined portfolios as reflective summaries of self-reflected artifacts, representations of teaching credentials and competencies, holistic views of teachers, and documentation for strengthening interview.

Components of the Teaching Portfolio

Material of Oneself

- The individuals resume'
- A philosophical statement of teaching and Agricultural Education Programs, reflecting the individual's view of the teacher's role and how the individual's activities will fit with that philosophy

Material from Others

- Student course evaluation data, statements/evaluations from mentors, administrators, supervisors, etc. who have observed the individual in teaching situations
- Documentation of teaching development activities, such as attendance at conferences or workshops
- Honors or other recognition such as teaching recognition or nomination for such an award

Products of Teaching

- Examples of lesson plans and unit plans (worksamples), indicating ability to develop and teach curriculum
- Videotape of a lesson and/or best teaching practices, demonstrating the individual's abilities as a teacher

Other Items

- Reflection statements for each area of development in the portfolio, such as teaching, philosophy, classroom management, student teaching experience, and the portfolio itself
- Pictures, newspaper clippings and evidence of successful teaching that add individuality and a personal touch to the portfolio

Positive Outcomes of Teaching Portfolios

The Agricultural Education Program at OSU has observed distinct benefits from having students complete teaching portfolios. Pre-service teachers benefited by reflecting upon their teaching experience as they compiled their own effective teaching strategies. The end product also served as a valuable instrument to prepare for job interviews and the interview process. Students' that developed electronic portfolios were able to demonstrate their ability to use and integrate technology to a potential administrator.

Throughout the portfolio development process, students were reflecting and synthesizing their accomplishments and experiences during teacher preparation courses and student teaching. Students came away from this process with a clear understanding of their effectiveness and need for further refinements in the classroom. The development of philosophy statements, further defined their understanding of what makes them effective in the classroom. Students actually practiced their philosophical beliefs while student teaching and further defined their philosophy and goals of becoming effective teachers. The reflective piece in this development process is what delineates the difference between a meaningful document and a set of meaningless papers and video clips. The importance of communicating clear philosophical beliefs and following those beliefs with documented evidence makes a truly significant difference in the quality of the portfolio.

Follow-up interviews with school administrators have indicated that the portfolio was an important element to assist the hiring team in effectively evaluating the prospective teacher. Principals and teachers alike, have admitted that portfolios are becoming an effective interviewing tool. Students were able to show the work they have produced and their growth throughout the teacher preparation program and through their student teaching experience. In some cases, the portfolios have made the difference between landing the job.

Summary

Just as an artist uses a portfolio to illustrate their talents, a teacher portfolio is designed to demonstrate the teacher's talents and goals (Doolittle, 1994). The student teacher may present the portfolio to the interview team as a hard-copied document in a three ring binder, and/or as an electronic form, floppy disc, compact disc (CD) or WEB page that can be viewed before, during or after the interview process.

Pre-service teachers' experience with building portfolios resulted in a meaningful end product, which allowed self-reflection, a user-friendly product, and improved knowledge base in technology. The question educators will be asking themselves isn't if they should utilize portfolios, but how they can best utilize them to improve teaching and learning and to best market themselves as professional teachers.

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Why Johnnie Can't Coach a CDE

Poster Abstract

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Introduction

The spring semester is a busy time for student teachers. Student recruiting, training and practicing with FFA Career Development Event (CDE) teams is one of many activities a student teacher has the opportunity to look forward to during their 12-week internship. Unfortunately, student teachers going out in the fall semester have less of an opportunity to gain experience recruiting, training and practicing with students for FFA CDE's than do their spring student teaching colleagues due to the scheduling of career development events during the spring of the year. Competitive events can serve as a mechanism for agricultural educators to motivate students to perfect and advance their occupational skills (Gamble, 1986). However, Gamble (1986) noted no significant relationship existed between contest preparation and occupational preparation. Can Career Development Events prepare students for careers in Agriculture?

Deeds and Thomas (1999) found the advisor was considered to be the key factor for students in deciding which CDE to choose to participate and that teachers should engage in activities that enhance classroom instruction and career opportunities.

The Agricultural Issues contest is a new Career Development Event offered during the annual Oklahoma State University Interscholastic Event during the month of April. Providing an opportunity for students to identify, research, plan, and present an agricultural issue before an audience of judges is one of the objectives of the event. Although, this event provides an opportunity to promote the integration of analyzing agricultural issues and public speaking skills in local school academic subject matter areas, there has been very little participation at the state level contest. Fewer than five teams have registered and actually participated in the annual FFA activity.

The purpose of this activity was to provide the fall 1999 student teaching class with an opportunity to train and coach a FFA career development team for competition during their 12-week student teaching experience. A goal was to expose more students and FFA chapters in Oklahoma to the Agricultural Issues Career Development Event.

Methodology

The state-winning Agricultural Issues CDE team and coach from the spring 1999 state contest were invited to the OSU campus to make a presentation to the student teacher group during the four-week block early in the fall 1999 semester. Utilizing costumes and props, FFA members conducted their presentation of the advantages and disadvantages of corporate swine operations in Oklahoma. Student teachers assumed the role of judges and asked questions of the participants. For the entire student teacher class, this was their first exposure to this particular

CDE. Following the presentation, FFA members and student teachers interacted during a question and answer session to discuss why FFA members compete in CDE's, what FFA members expected from their CDE coach, and provided suggestions for motivating high school students to get involved and participate in such activities.

At the completion of the four-week block, student teachers were challenged to go out to their cooperating centers and recruit and train an Agricultural Issues CDE Team for a special invitational contest to be held later in the fall semester on the OSU campus. The OSU Collegiate FFA Chapter was charged with coordination and sponsorship of the event. Since this was an invitational contest, and no student teachers had coached an Agricultural Issues team prior to this activity, nor had any of the cooperating centers fielded an Agricultural Issues team, previous experience was not a factor or an advantage for any team participating in the contest. All student teachers indicated a willingness to train and bring teams to the contest. Over half of the student teachers in the fall class brought student teams to compete. Undergraduate agricultural education students and Collegiate FFA members served as official judges. The Collegiate FFA Chapter provided plaques to the first and second place teams and a barbecue lunch for all participants.

Implications

1. Student teachers going out in the fall were provided the opportunity to recruit and train a career development event team from their cooperating center during their 12-week internship.
2. Evidence of coaching a student CDE can be included in the student teacher portfolio.
3. FFA members were exposed to a new CDE.
4. More Oklahoma FFA chapters have been exposed to the Agricultural Issues CDE.
5. It is expected the FFA members will encourage their advisors to continue training for the Agricultural Issues contest and participate in the State FFA Oklahoma State University Interscholastic Field Day in spring 2000.

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Examining the Significance of the Refined FFA Mission Statement

Poster Abstract

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In the 1980's many forces challenged American agriculture and education. Educators, farmers, individuals in agribusinesses and public institutions recognized the need to adjust goals and policies that directly effected agricultural education. Changes in agriculture spawned changes in agricultural education programs. Agricultural education was at a crossroads and was faced with these challenges as agriculture continued to change rapidly.

The publication entitled, Understanding Agriculture New Directions for Education, 1988, addressed many challenges that agricultural education was facing and developed principles, conclusions and recommendations that provided guidelines to address challenges. One principal conclusion and recommendation for agricultural education and the FFA organization focused on reform efforts within vocational agriculture programs that rely on strong programmatic leadership at the state and national levels. Major leadership challenges included program evaluation, teacher education, curriculum development, assuring adequate resources at the local level, and creating more flexible legislative and budgetary framework.

Additionally, in 1989, The National Summit on Agriculture Education participants suggested that bold, innovative thinking must be encouraged in the changing field of agricultural education. The mission of agricultural education was to provide a total dynamic educational system, aspiring to excellence and serving the needs of all people. , Goals were set, concerning updating and providing mission statements, serving all groups, expanding the whole person concept of education, developing educational programs to meet demands, fostering free enterprise, providing leadership, and elevating standards of excellence in all facets of agricultural education.

One of the important components of the total agricultural education program is the FFA organization. The FFA sought to address these challenges by continuing to perfect the image that it portrays to the youth of America. One area that was pursued was the implementation of a mission statement that provides central focus to what FFA does to assist in preparing young people for college and agricultural careers.

A plethora of literature exists that supports the use of mission statements in education and businesses. In fact, mission statements began as important tools to direct future decision-making of the entity it represents. Mission statements also influence the shape of an organization and they are used to stability for changes, or even serve as a catalyst for change. A properly crafted mission statement is a beacon that provides strategic direction for educational purposes. A mission that provides direction and linkages can serve as the base for its' measure of effectiveness. More specifically some agree that three particularly important components of mission statements to be purpose, values and description of skills.

Recognizing the important role that mission statements play in businesses and agricultural education, a visioning committee representing the National FFA Organization board of directors recommended to the board at the July 1993 board of directors meeting that the following mission statement be adopted:

FFA makes a positive difference in the lives of students by developing their potential for *premier leadership, personal growth and career success* *through agricultural education.*

It is a goal of the FFA to continually improve the mission statement by defining it in much detail. In April of 1999, FFA brought together representatives from businesses and industry, (which included both management and human resource representatives-both agriculture and non-agriculture), university agricultural education representatives, agriculture leadership staff, The National Council for Agricultural Education (NCAE), USDE, the FFA, FFA Foundation, National Association for Agriculture Educators (NAAE), state agricultural education leaders, and individuals representing other leadership and youth-focused groups (such as American Management Association) to further define the FFA mission statement.

The purpose of the meeting was to define the three components of the FFA mission statement premier **leadership**, **personal growth** and **career success**. As a follow up to the task force definitions of the three key components of the mission statement the FFA Board of Directors wanted to gain input from both the businesses and agricultural education communities on the revised mission and determine if these communities agree (at least generally) that the defined components and precepts are of value and are significant with the essential skills students acquire through FFA as they prepare for a future in the agriculture, food, fiber and natural resources system.

A detailed survey form containing the definition of each key area of the mission statement and each precept was used. Individuals were to rate the significance of each precept based upon his/her opinion.

The results of this study indicated that the input from both communities surveyed, education and businesses, agree that the three components of the FFA mission statement, premier leadership, personal growth, and career success and their precepts, are moderately and highly significant and are on target with what students acquire through the FFA organization activities.

Because of the strong positive skewness of the data, this study suggests that both communities, education and business, generally agree that the three components and their precepts are of value and are significant with the essential skills students acquire through FFA as they prepare for a future in the agriculture, food, fiber and natural resources system.

This study indicates that the education community views the personal growth precepts differently than the business community (human resources and front line managers). Those personal growth precepts are spiritual, emotional, and social.

Results from this study may provide the building blocks for an evaluation and data management system to be utilized by the National FFA Organization so that the FFA mission statement can continue to be studied and improved.

In 1993, the National FFA board of directors, including the officers, directors, consultants and staff was charged with the task of taking full responsibility for assuring that everyone connected directly or indirectly with the FFA organization understands its reasons for existing and have a clear vision of precisely what the organization strives to accomplish. The National FFA staff was directed to focus all resources (time, energy and finances) on the achievement and studies of the FFA mission statement. This "charge" was the impetus behind the need for the refined FFA mission statement study.

As the world of agricultural education changes, so must the mission statements that are within the agricultural education realm. As these changes continue to occur, the National FFA organization will need advice, guidance and innovative input from the education and business communities. Research and affirmation of the FFA mission statement of today will help provide guidance to students who are ultimately our leaders of tomorrow.

Integrating Animal Science Courses in High School Agricultural Education Programs in North Carolina

Poster Abstract

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The National Research Council (1988) revealed that much of the curriculum in agricultural education was outdated. In 1995 a survey was conducted by agricultural teachers in North Carolina to ascertain what new courses they would like to see offered in high school agricultural education programs. A series of animal science courses was selected and ranked on top as to the perceived courses to be added to the program of study.

A cross section of educational professionals was assembled in 1996 to begin developing competencies and objectives for animal science (1), animal science (2), and equine science. The committee consisted of agriculture teachers, extension agents, university faculty members from animal science, agricultural education, and agribusiness.

The Agricultural Education Team from the Department of Agricultural and Extension Education at North Carolina State University released curriculum course outlines, blueprints and competency-based evaluation test item banks in the Fall of 1998. Currently there are more than 200 high schools offering animal science in North Carolina with many more making plans to pursue this specialty area.

Purpose and Objectives

Animal science is vital to the food chain for all people and affects agribusiness as well as technology. In North Carolina the farm income as reported by the North Carolina Department of Agriculture is a billion-dollar industry. Swine production is ranked 2nd in the nation, turkey production is ranked 1st, dairy is in the top 10 and the equine industry is enjoying tremendous growth.

The purpose of this project is to prepare educators who are interested in developing new courses or programs of study for high school agricultural programs. It is designed to provide opportunities for sharing existing course outlines, blueprints and competencies with fellow educators; develop specific educational objectives for agri-science programs; develop a delivery method utilizing multimedia instruction; improve collaboration between extension agents and high school agriculture teachers; and finally, to develop competency-based measures for students, teachers, state department specialists, and university faculty.

Procedures

Animal science is a year-long course for the traditional seven period day schedules or the new four-by-four semester block schedule. This course is designed for students 9-12 in North Carolina Public Schools. Essential elements for this course and units and topics of instruction are listed. The curriculum committee recommended a primary textbook to be used for this course. There are also secondary references. All essential elements will be met by using designated references from both primary and secondary sources.

A course blueprint provides information regarding the recommended hours of instruction for each unit title/competency and objective statement as well as information indicating the percentage of weight each objective statement has in relation to both the course and the unit of instruction. Type of outcome behavior is identified as either "cognitive 1,2,3," "psychomotor," or "affective" for each competency and objective statement. Additionally, related skills were identified for arts, communications, health/safety, math, science, and social studies, as well as vocational or JPTA skills. The blueprint is designed to provide 108 hours of teaching content. Twenty-seven additional hours of teaching time remain for local adaptation by the teacher if the course is offered on a block four 135 hour unit, and 72 additional hours of teaching time remains for local adaptation by the teacher if the course is offered on a traditional 180 hour unit.

Outcomes

The project has proven to be very successful. Many agricultural education programs have either added animal science or substituted the traditional agricultural production for animal science. In less than two years, North Carolina went from 0 to > 200 animal science programs. Student numbers are up with a more diverse class make up. Equine science continues to attract a large number of females and bright students. Parents are very supportive and have elected to make numerous donations of animals, equipment and personal time to these programs. Many programs are beginning to get science credit and are co-teaching with science teachers. New teachers and student teachers are utilizing technology by teaching with Power Point and Web-based materials such as Oklahoma State Animal Science Department's Breeds of Livestock. Finally, the agribusiness industry has been a tremendous support providing classroom resources, lab equipment and job opportunities for the students in North Carolina. The addition of animal science to the North Carolina Agricultural Education Program of Study has improved our positioning to meet the needs of students preparing for careers in the twenty-first century.

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Using Electronic Media in Career Development Events

Poster Abstract

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Registering and disseminating results for 13 Career Development Events (CDE) can be tedious and time consuming when using paper methods. One method maximizing efficiency of state staff and secondary agricultural education teachers' time and energy is utilizing various sources of electronic media.

Rules and pertinent career development event information have been available for several years on a website operated by the Nebraska Institute of Agriculture and Natural Resources (IANR). Starting in 1999, Nebraska secondary agricultural education teachers were required to register their students via the CDE website to compete in the annual state agricultural education career development events. This past spring not only did teachers register their students on the web, but individual and team scores and rankings, as well as photographs of the finalists were available only on this web site.

Traditional methods of registration and dissemination of results of career development events were completed by paper methods prior to 1999. Teachers would receive a packet in the mail including event updates and event registration forms 4-6 weeks prior to the registration due date. Registrations were completed and returned either by U.S. Postal Service or faxed. Some registration forms were typed others were handwritten. The quality of the handwriting or fax determined the accuracy of schools and spelling of participants' names. Registrations were lost in the mail or sent to the wrong place. Disseminating results had similar problems. The number of events and student participation were increasing and the schedule was reduced from 3 to 2 days. Paper results and ribbons were sent via postal mail the day after the events. Teachers would receive these 2-3 days later. It was this frustration plus the fact there was a more efficient and expedient manner of registering and disseminating results that lead to using electronic media. A concern of this project was ensuring a successful transition of teachers to electronic use.

The purpose of this project was threefold. First, increase the efficient use of time and resources. Second, increase school and student entry accuracy. Third, utilize available technology. Paramount to a successful transition to electronic delivery was the communication between the teacher and state CDE coordinator. Even though this may not have been an objective of the original project, it was key in implementing the electronic registration process. In-service was made available as well as mailing detailed registration instructions.

Resources and Procedures

To register and receive results electronically, teachers needed a computer with internet access. The internet browser needed to have versions 3.0 and higher of Netscape Navigator or Internet Explorer. A printer was necessary to provide a hard copy of registrations. All teachers were provided with an on-line procedures document and passwords. Teachers were encouraged and provided in-service at the district level. In-service was conducted by state CDE staff explaining and demonstrating the electronic registration procedure. Teachers then had the opportunity to register a team electronically. This was beneficial to the teacher to see how the system worked. It also served as a check to see if the system was working.

At the state level, a webmaster was key to the success of electronic delivery. In our case, undergraduate students serve as the electronic technicians and are instrumental in preparing, delivering, and compiling registration information and event results. If they have any questions, they ask assistance from our building's computer technician and/or IANR's file server administrator. Computer(s) with server access and space are needed. Until recently, the CDE website only used HTML 4 programming. A few Java Script highlights have been added by using quick link boxes. If teachers were using older browsers, they were not able to access registration and result information. Result pages were coded using Microsoft Excel. As well, both Hotdog and Arachnophilia software pages were used to code. Due to the nature of our file server, File Transfer Protocol (FTP) was used to transfer files to and from the server.

Registration information received from the teachers was downloaded and imported into Microsoft Excel. The data was manipulated to provide registration lists and working spreadsheets to event directors (faculty). Excel files were sent electronically. After the event, results were processed on the Excel spreadsheets. Excel macros were made in advance, allowing the director to instantaneously score and rank individuals and teams. These tables were posted on the web as soon after the awards ceremony as possible.

In the past, the IANR Computing Information Technology (CIT) department provided press releases of the events as well as photographs of the top 3 teams and individuals available to all Nebraska weekly and daily newspapers. This service was not available in 2000. CIT electronically delivered a press release stating electronic pictures and instructions on how to download the top individuals and teams were available on the CDE website. Undergraduate students took digital pictures and processed the images with Photoshop. Images were saved as JPEG files and uploaded to the CDE website.

Access to the CDE website was controlled to pages containing students' pictures, scores, rankings, and high school affiliation. Passwords were distributed and used by teachers and news editors to access this information.

Results

A total of 3,250 event contestants were electronically registered. All 130 schools registered electronically by the March 15th due date. Only 3 team registrations were lost in "cyberspace". Registration tasks (from teacher to event director) were completed in 2 days compared to 10-14 days under the old method.

All event results were available for the awards program. In previous years, typically 2-3 events' results were not available. Results and pictures were available electronically 7 hours after the awards programs compared to 2-3 days under the prior system. The CDE website had 300 visitors the day after the awards program. Visitors reflect a combination of teachers, newspaper editors, and students.

Accuracy was difficult to measure. Misspelled names and errors in ranking teams and individuals were two factors to avoid. There were fewer errors with electronic technology (98% accuracy as compared to the prior system), though the information was only as accurate as the individual who entered the data.

Conclusions

Electronic registration and result dissemination of Nebraska Agricultural Education Career Development Events have been widely accepted by secondary agricultural education teachers and newspaper editors. Also, teachers utilized the rules and study guides in their instructional programs.

Communication to all stakeholders was key to a smooth transition and continued use. In-service, as well as annual written communication to teachers and newspaper editors, was important to update annual changes and procedure requirements. As well, providing CDE staff 2 weeks prior to and after the events to answer any procedure questions by teachers and newspaper editors was helpful.

Highly trained and motivated undergraduate students were key to designing and operating this CDE website.

As teachers use electronic media, they request more programmatic efforts using this dissemination medium. It was important to design the CDE website to be used by the minimum system component. For example, teachers using an internet browser version lower than 3.0 could not access registration forms.

Using Real Cases for Instruction

Poster Abstract

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Introduction

Do you need to help students to build analytical and synthesis skills, learn to solve problems, develop mature judgment and critical thinking skills or enhance communication skills? If so, then you may want to consider using case studies in your instruction. Decision cases are teaching tools, which are well suited for interactive learning about agricultural issues, policy and management strategies. Case studies are similar to the storytelling approach to teaching and learning in that higher order learning is achieved beyond the specifics of the case itself. The student can understand the broader implications and ethical interpretations of certain decisions when using this approach. Decision cases represent reality and place the student in the position of discovering knowledge from a real situation. Cases can be issues of national concern or they can be localized to a particular region or community.

The case can be used for large class discussion as well as small group collaboration and integrated writing assignments. Cases can be used to illustrate parts of larger issues, to illustrate how values and beliefs influence the decision making process and conflict resolution. Case studies foster cooperative learning which is effective in allowing students to create knowledge rather than passively listen to yours. Research has demonstrated that cooperation among students produces greater achievement and higher-level reasoning, more positive relationships, greater acceptance of differences, and higher self-esteem.

Methodology

The first step is Assignment and Engagement. Students are usually given an assignment before the discussion. The assignment could range from something as simply as reading the case to a more complex task such as evaluating case information or doing background reading. The teacher might also use audio-visual aids or local news articles to enrich the students' understanding of the case. This helps get the student involved and develops a sense of ownership in the case. A series of opening questions seems to work well. The second step is Analysis and Discussion. The students systematically analyze the case and discuss it under the direction of the teaching objectives. Good questioning skills are important for the teacher. The third step is for the students to Respond to the case discussion and analysis. A decision does not always need to be made, but it usually is. The response can take many forms, such as recommending what decision should be made, expressing feelings during case discussion, conducting further case analysis, or identifying additional information needed to make an informed decision. Most of the cases are discussed with the total group input, then smaller groups work to investigate the facts and myths of the issue before a response is made.

Every case used should be used for a purpose. You should use the case to 1) define the dilemmas faced by the parties involved. This includes a presentation on the problems, undesirable outcomes, the parties involved in the issue, and the goals or objectives of each of the parties. 2) Determine the cause of the problem. This may involve providing examining the historical context, a shift in value paradigms, or similar causes. 3) Create some alternatives. 4) Select the "best" alternatives after the consequences are determined for each of the alternatives. It is important that the discussion leader help the student to discover the "facts" and the values of the case. This is difficult as many groups use scientific data to support their arguments in a particular issue.

Results/Implications

Many positive comments have been received from student evaluations. Students have said, " . . . the class has been really good. We have discussed issues that I was not informed on. I have realized it is important to be aware of the facts and to not just repeat what I have heard from TV . . . The experience of speaking in front of a group has certainly helped me . . . The relaxed environment of the class is great because it generates responses from students who otherwise would not say anything . . . hearing various opinions has also been good . . . I will certainly recommend this class to fellow students." From my observation, students also learn to grapple with complexity and ambiguity, work in groups, organize and synthesize issues, and realize that many decisions are based on political agendas.

Advice to Others

This is not an approach if you like to have a structured lecture. You must be flexible and willing to allow for discussion to move in many directions. You must be alert to emerging issues and keep up to date with current events in many fields. You must be a generalist, not a specialist. The greatest skill needed is the ability to ask probing questions or introduce additional information or hypothetical characters to broaden the case's perspective. Many times you must question the reasoning ability of the student.

Some tips to effective use of this technique are to control the dominating student, try not to give the discussion too much structure, learn to ask probing questions, and try to include everyone in the discussion.

Costs/Resources

Case studies require a usage fee or purchase. Copyright laws protect some. Most sources allow for the duplication of the material for educational purposes.

References

Swinton, Scott M. (Ed). (1995). Teaching and learning with cases. Promoting active learning in Agriculture, Food and Natural Resource Education. College of Agriculture and Natural Resources, East Lansing, MI: Michigan State University.